



**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

## Tom Cat Designs LLC Protective Hull Modeling & Simulation CORRECTED Results For Iteration 1

**Sebastian Karwaczynski**

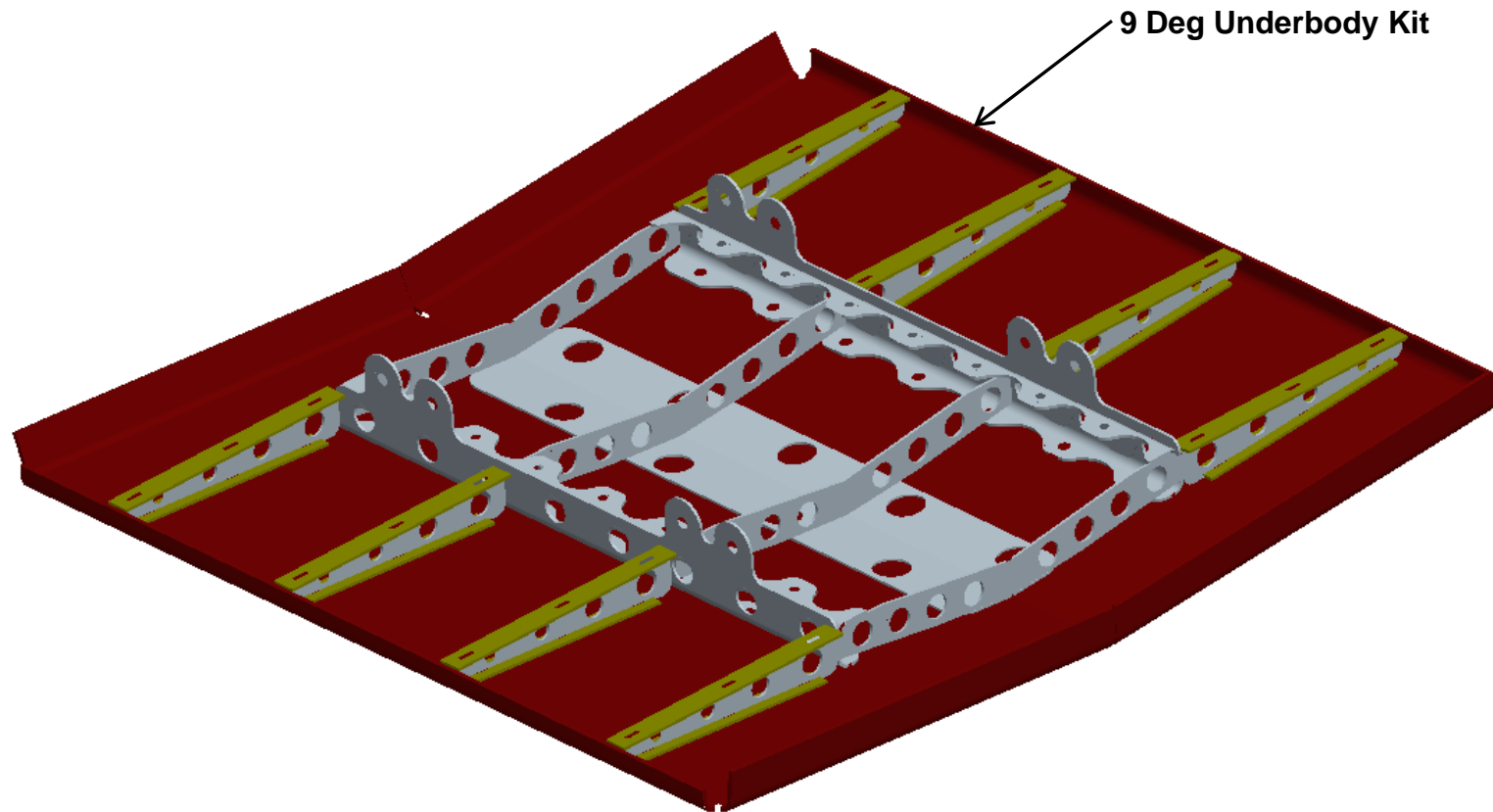
**23-May-2012**

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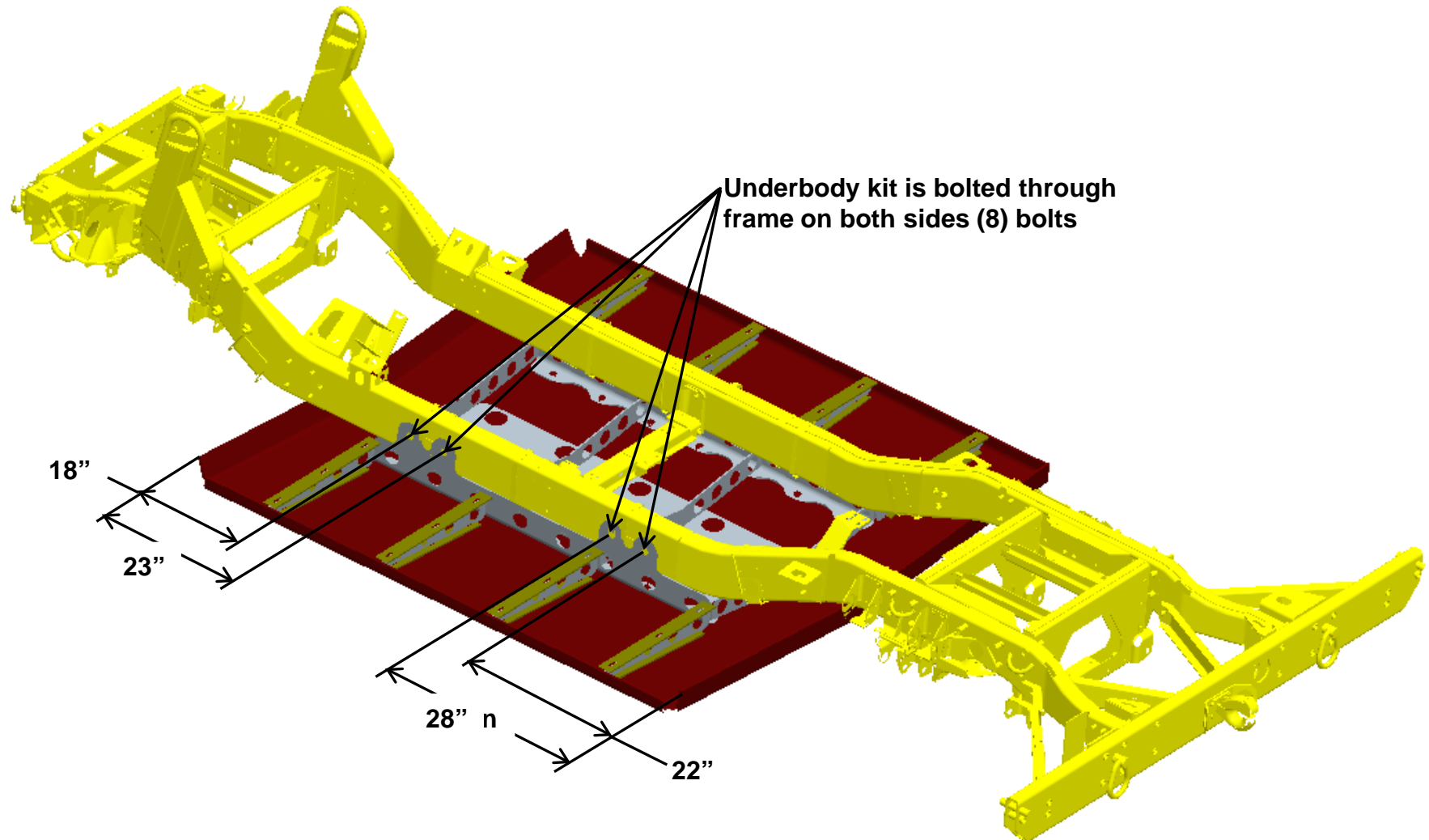
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- **Fit and Function Analysis**
- **Mobility Analysis**
- **Blast Analysis**
- **Design Suggestions**
- **Conclusion**

# Fit and Function Analysis 9°

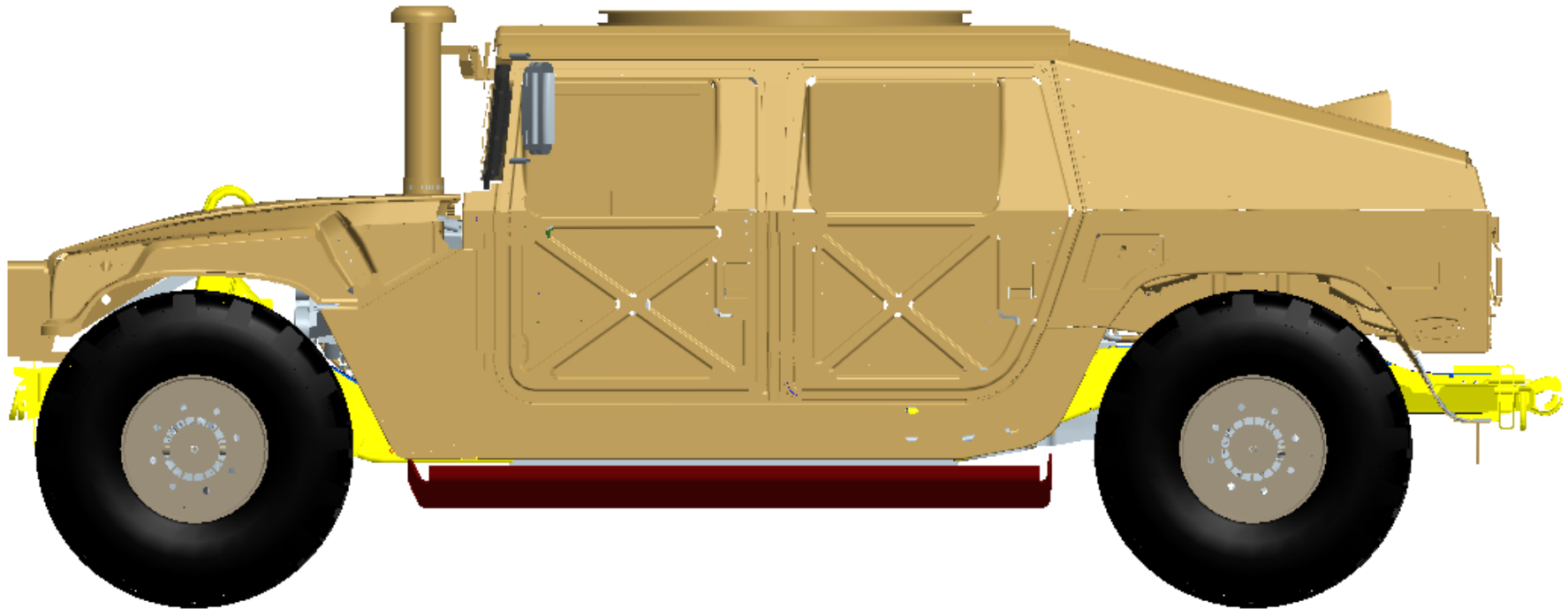


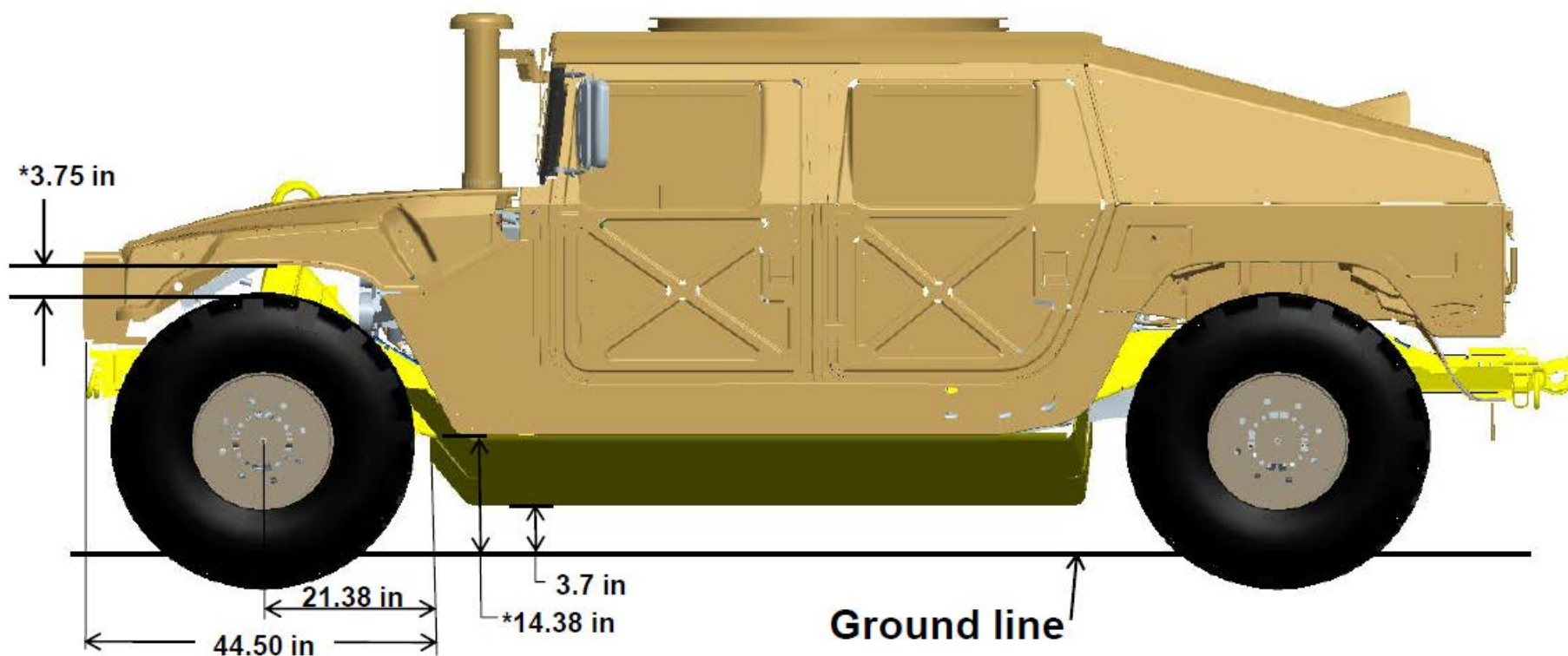




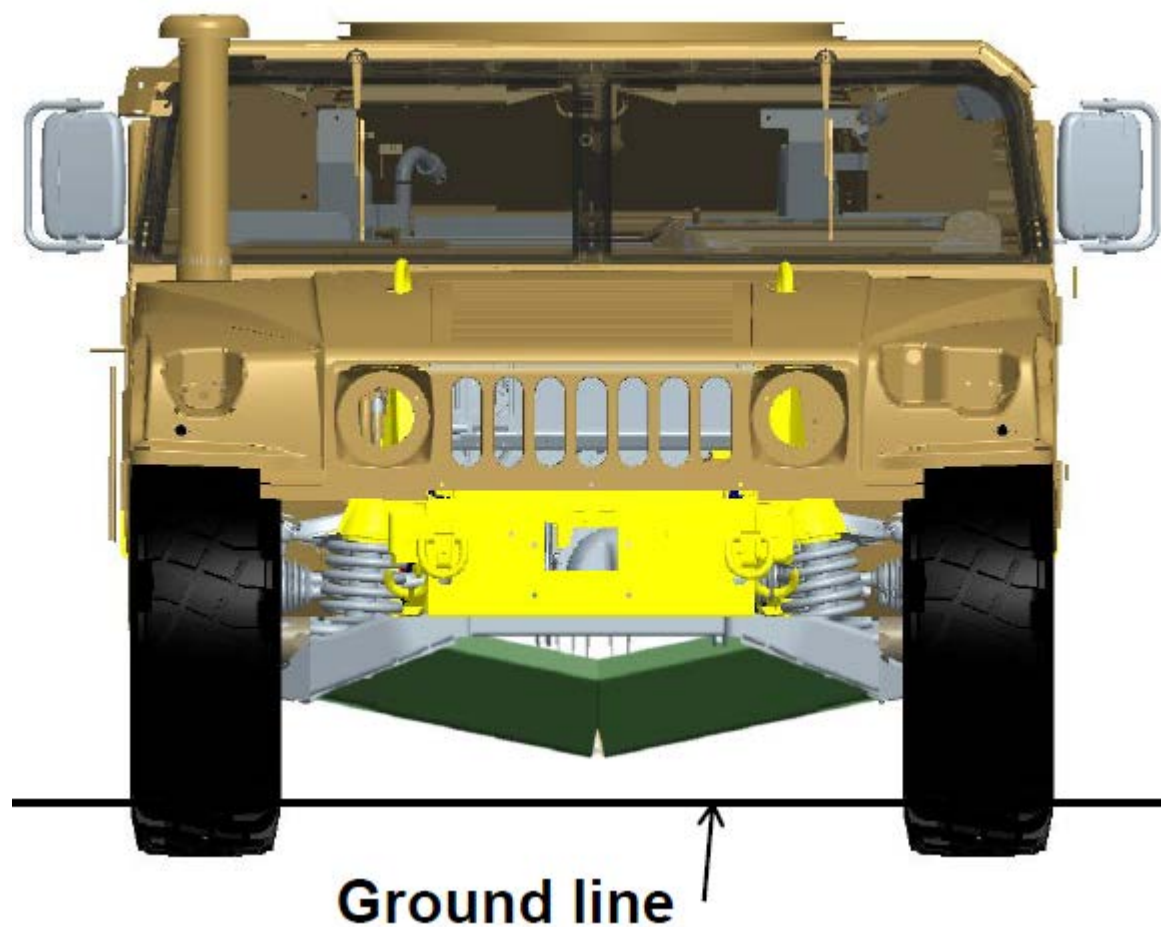
- During installation/removal of the underbody kit, the attachment locations are potentially difficult to reach.
- All 8 bolts are blind operation.

# Fit and Function Analysis 9°





\* Measured from actual vehicle



# Fit and Finish Analysis

- During installation/removal of the underbody kit, the attachment locations are potentially difficult to reach.
- All 8 installation bolts are blind operation.
- Ground clearance is significantly reduced with the 24° belly plate

# Mobility Analysis

Maneuver	Requirement	Baseline w/V-hull			Baseline w/OGPK & V-hull		
AVTP	43 MPH	44			42		
SS	40%	93.0			87.6		
RMS 1.00	30 MPH	50			50		
RMS 1.50	20 MPH	20			20		
RMS 2.00	15 MPH	10			10		
RMS 2.50	13 MPH	5			5		
HR4	50 MPH	50			50		
HR6	16 MPH	45			45		
HR8	15 MPH	35			35		
HR10	5 MPH	30			30		
CLEARANCE - HULL TO GROUND (IN)							
STEP	18 IN	Front	Middle	Rear	Front	Middle	Rear
	5	5.2	4.0	2.8	5.2	4.0	2.7
	6	5.0	3.5	2.0	5.0	3.5	2.0
	7	4.7	3.0	1.3	4.8	3.0	1.2
	8	4.5	2.5	0.5	4.6	2.5	0.5
	9	4.3	2.0	-0.2	4.3	2.0	-0.3
	10	4.0	1.5	-1.0	4.1	1.6	-1.0
	11	3.8	1.0	-1.7	3.9	1.1	-1.8
	12	3.6	0.6	-2.5	3.7	0.6	-2.5
	13	3.4	0.1	-3.2	3.4	0.1	-3.2
	14	3.1	-0.4	-4.0	3.2	-0.4	-4.0
	15	2.9	-0.9	-4.7	3.0	-0.9	-4.7
	16	2.7	-1.4	-5.5	2.8	-1.4	-5.5
	17	2.5	-1.9	-6.2	2.6	-1.8	-6.2
	18	2.3	-2.3	-6.9	2.3	-2.3	-7.0
	19	2.0	-2.8	-7.7	2.1	-2.8	-7.7
	20	1.8	-3.3	-8.4	1.9	-3.3	-8.4

# Mobility Analysis

Maneuver	Requirement	Baseline w/V-hull			Baseline w/OGPK & V-hull		
CLEARANCE - HULL TO GROUND (IN)							
STEP	18 IN	Front	Middle	Rear	Front	Middle	Rear
	5	1.3	0.1	-1.1	1.3	0.1	-1.2
	6	1.1	-0.4	-1.9	1.1	-0.4	-1.9
	7	0.8	-0.9	-2.6	0.9	-0.9	-2.7
	8	0.6	-1.4	-3.4	0.7	-1.4	-3.4
	9	0.4	-1.9	-4.1	0.4	-1.9	-4.2
	10	0.1	-2.4	-4.9	0.2	-2.3	-4.9
	11	-0.1	-2.9	-5.6	0.0	-2.8	-5.6
	12	-0.3	-3.3	-6.4	-0.2	-3.3	-6.4
	13	-0.5	-3.8	-7.1	-0.5	-3.8	-7.1
	14	-0.8	-4.3	-7.8	-0.7	-4.3	-7.9
	15	-1.0	-4.8	-8.6	-0.9	-4.7	-8.6
	16	-1.2	-5.2	-9.3	-1.1	-5.2	-9.3
	17	-1.4	-5.7	-10.1	-1.3	-5.7	-10.1
	18	-1.6	-6.2	-10.8	-1.5	-6.2	-10.8
	19	-1.8	-6.7	-11.5	-1.7	-6.6	-11.5
	20	-2.0	-7.1	-12.3	-2.0	-7.1	-12.3



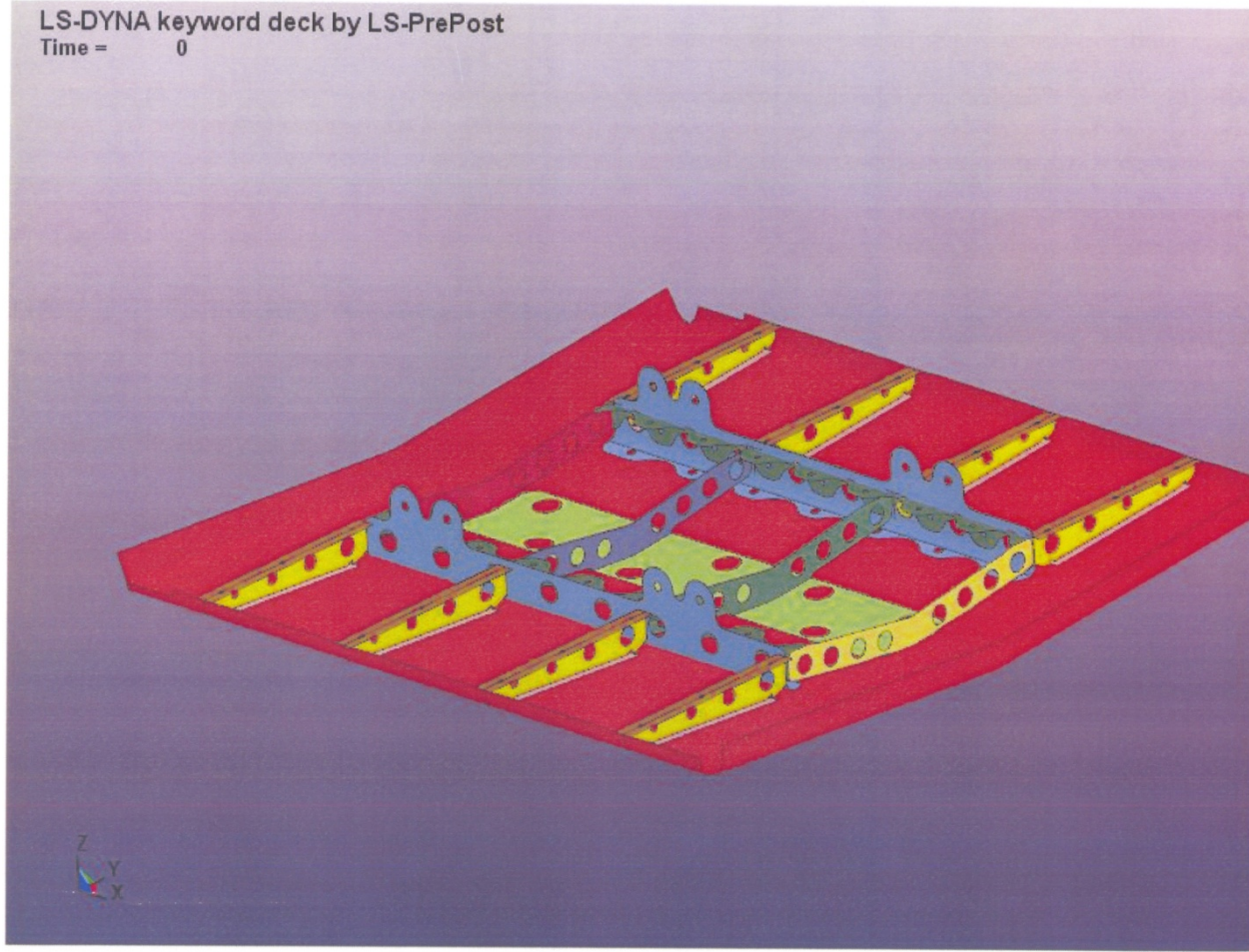
- With the V-hull configuration, **performance improved** for Double Lane Change Maneuver (AVTP) , Side Slope, Ride Quality, and Shock Quality due to lower CG height and increased weight. However, for course roughness's greater than 2.0" RMS and bump heights greater than 8" HR (Half Round) ground/hull **interference occurred.**
- With the V-hull configuration, **performance was reduced** for the Vertical Step due to ground/hull interference
- **Biggest risk is reduction in mobility over obstacles for the V-hull configuration**



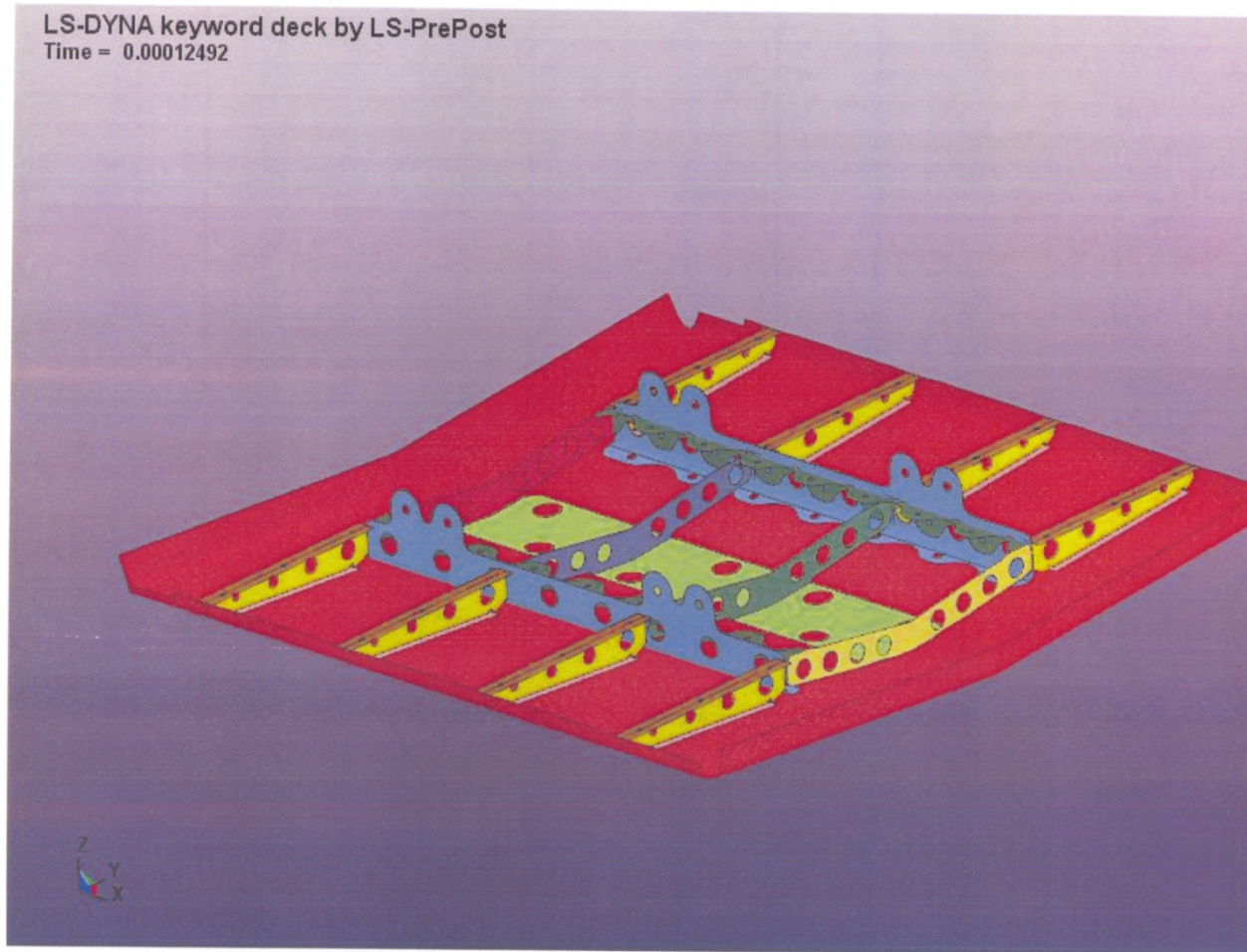
# Blast Analysis

- The following slides illustrate blast simulations for both the 9° and 24° V-Hull Designs

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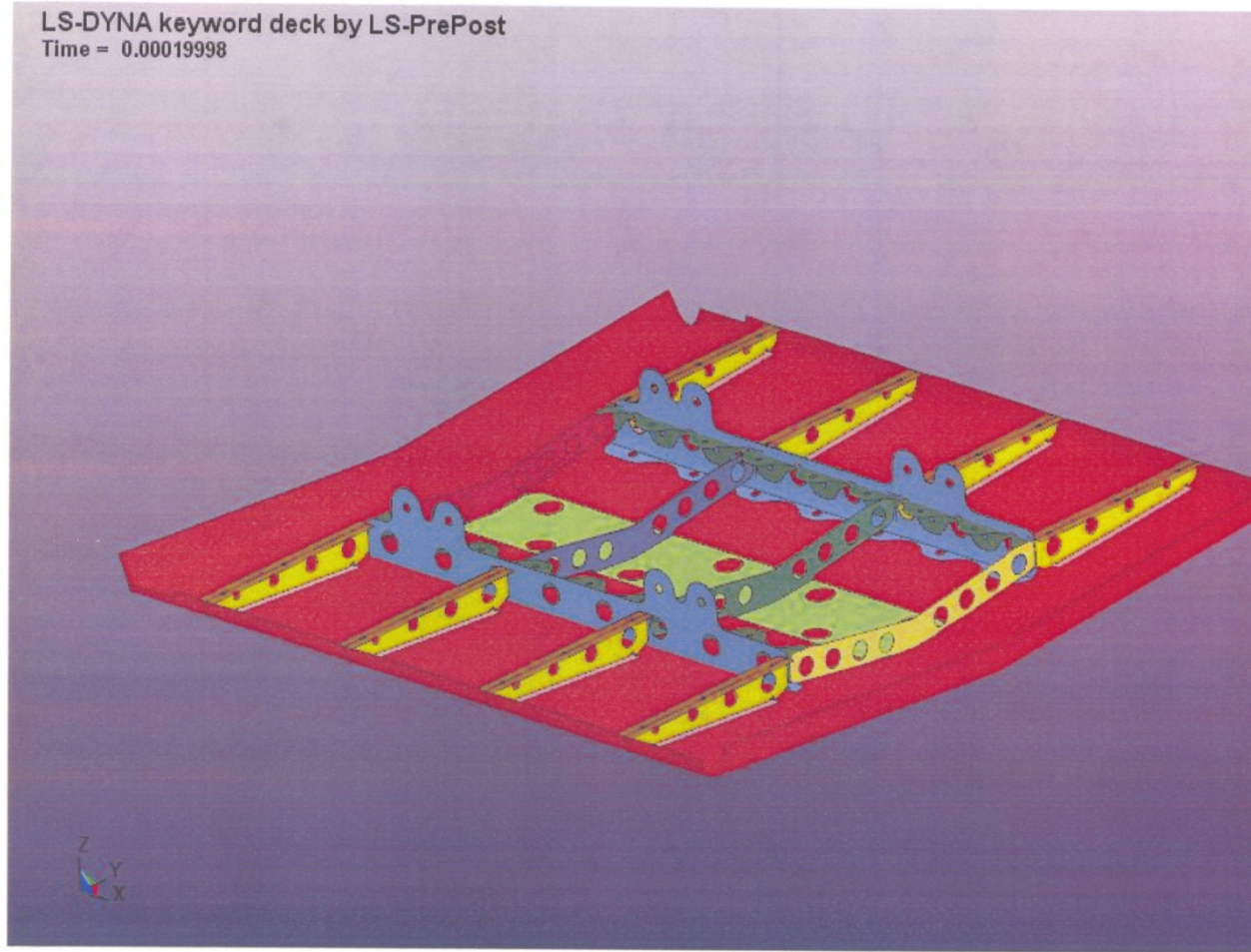


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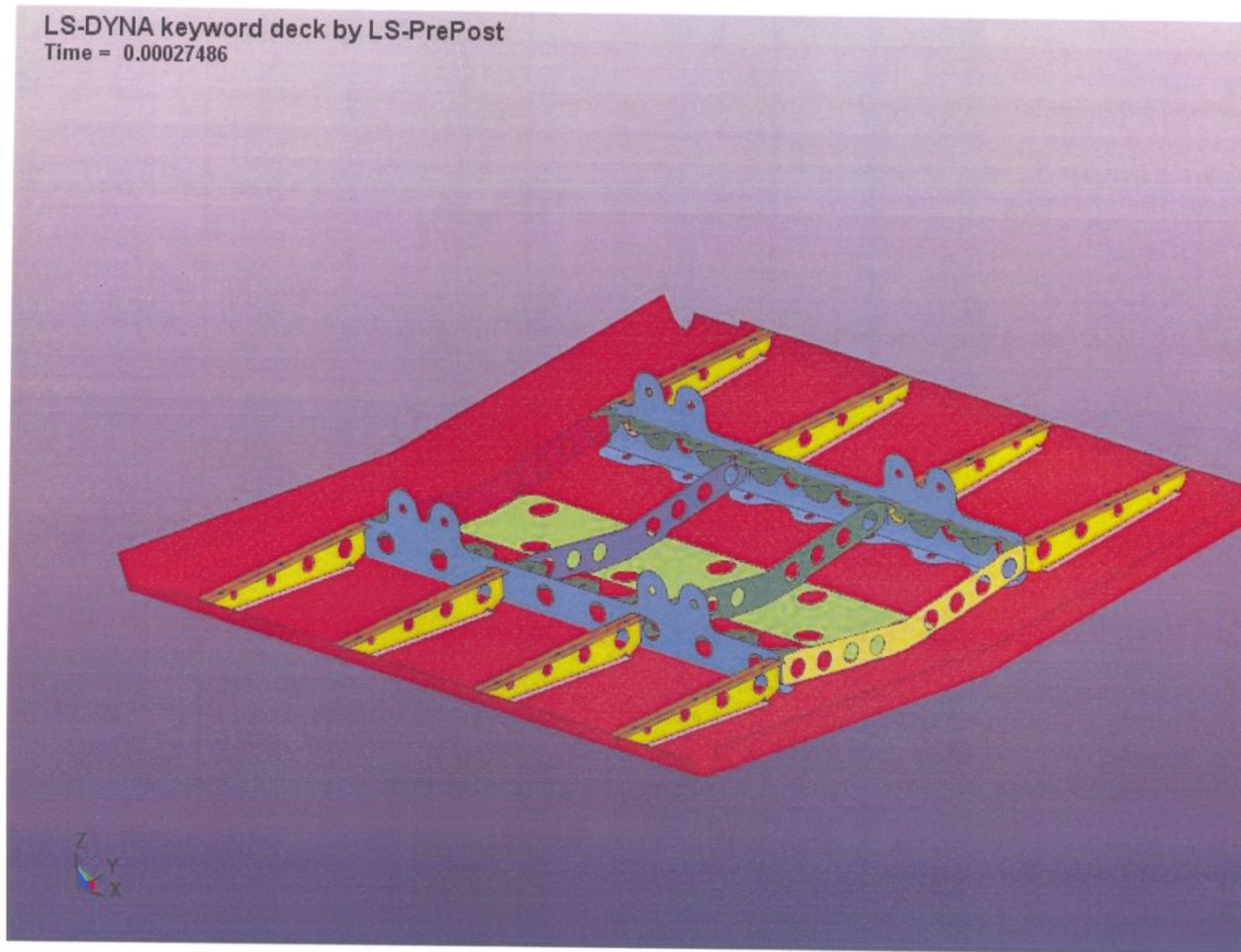




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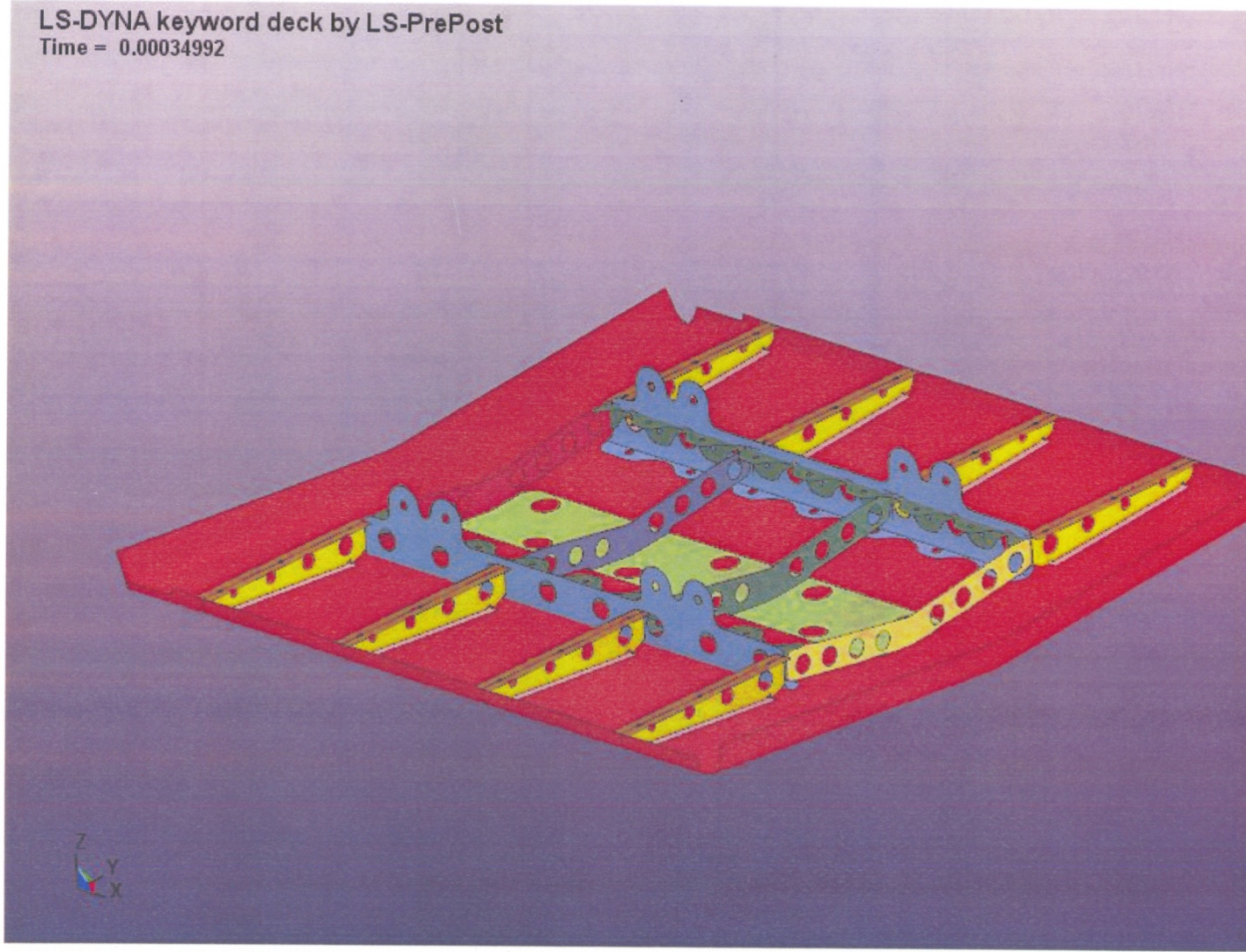


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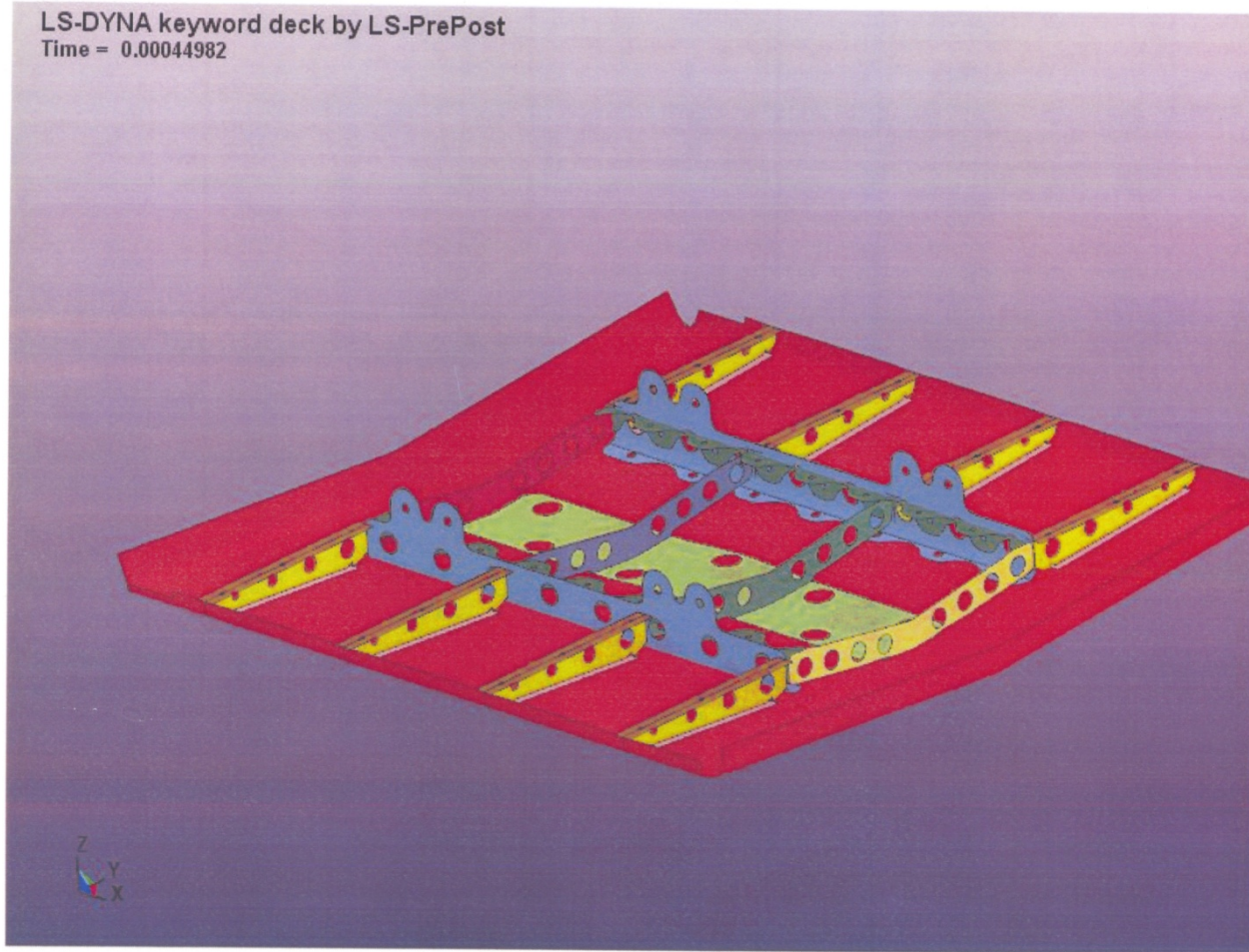




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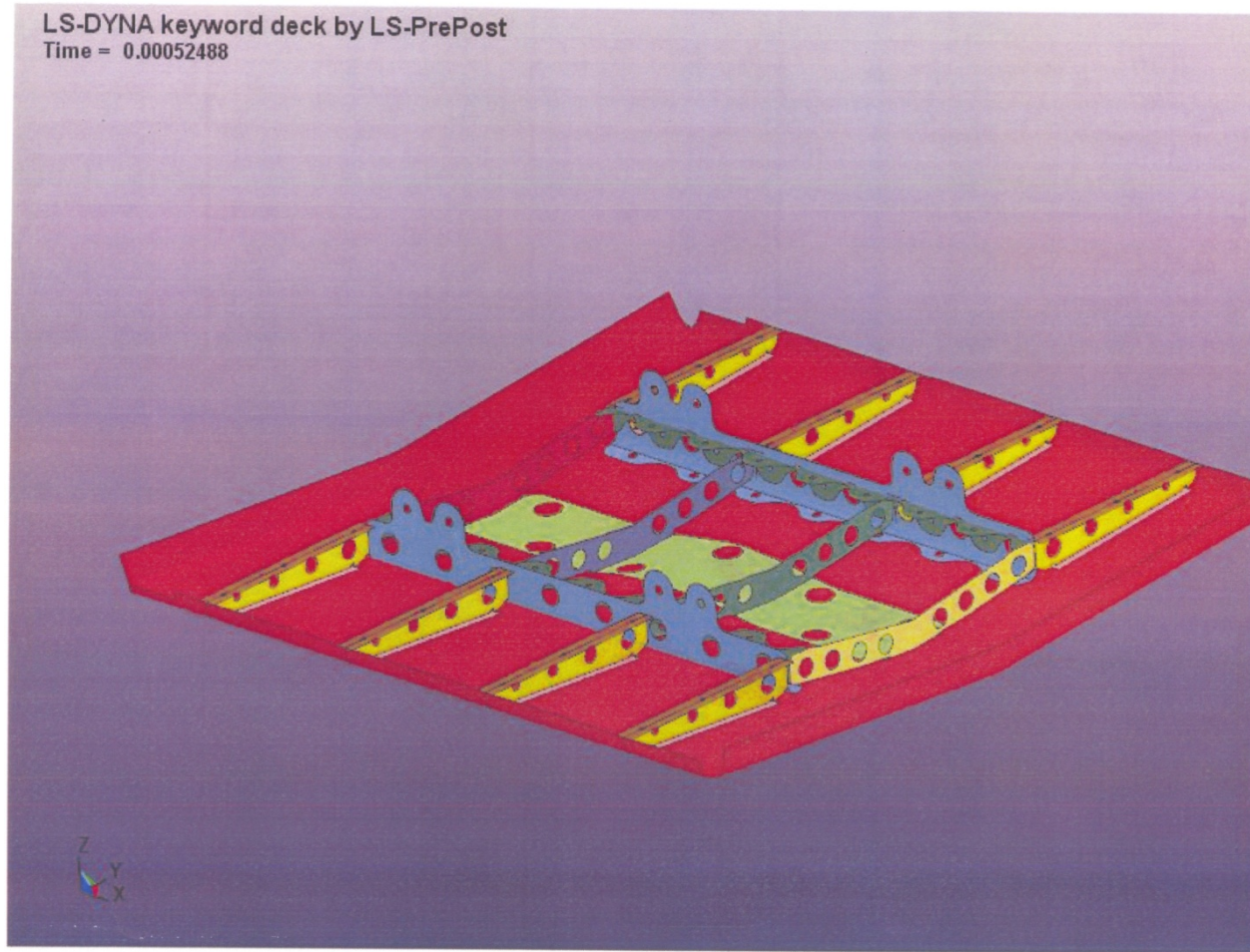


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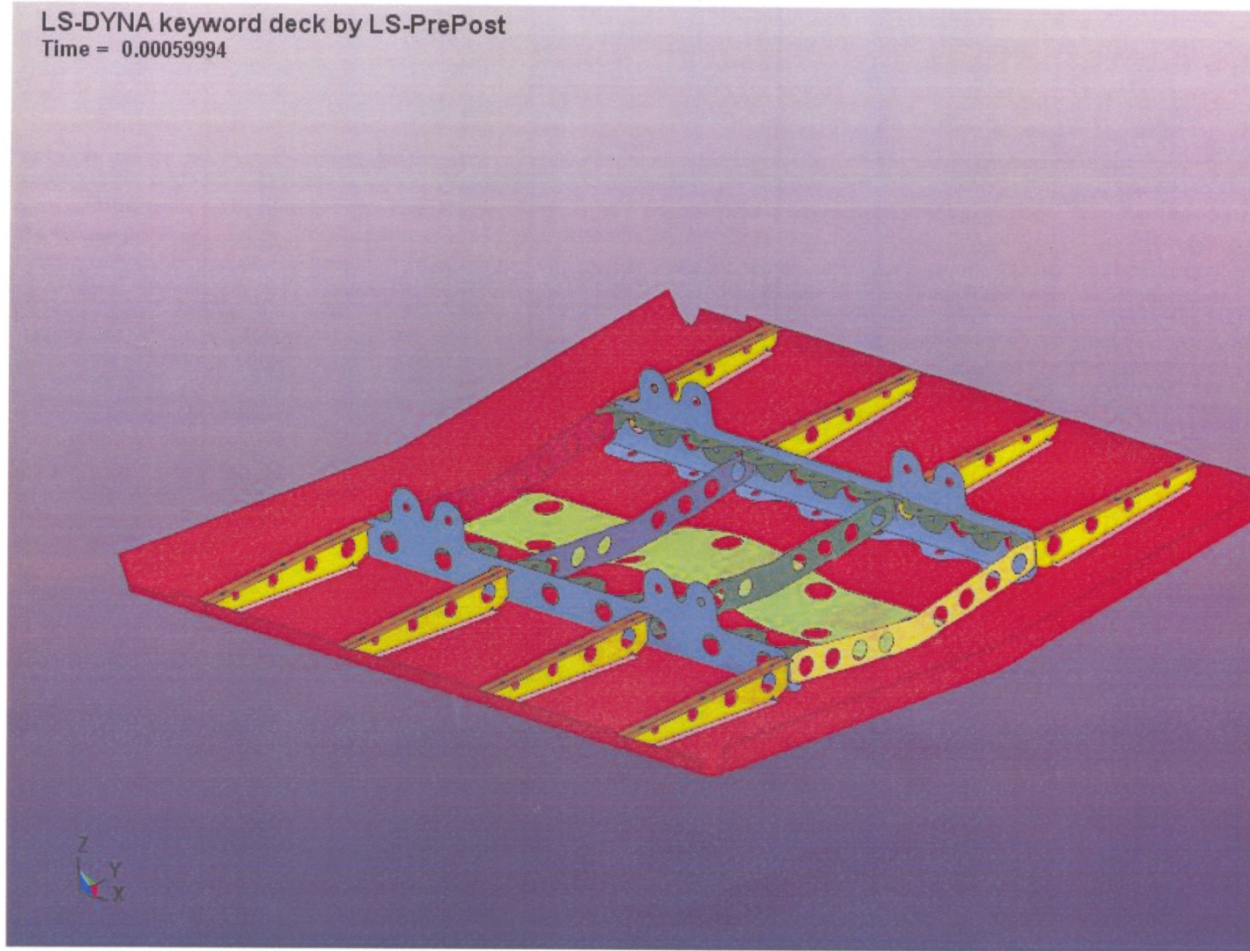


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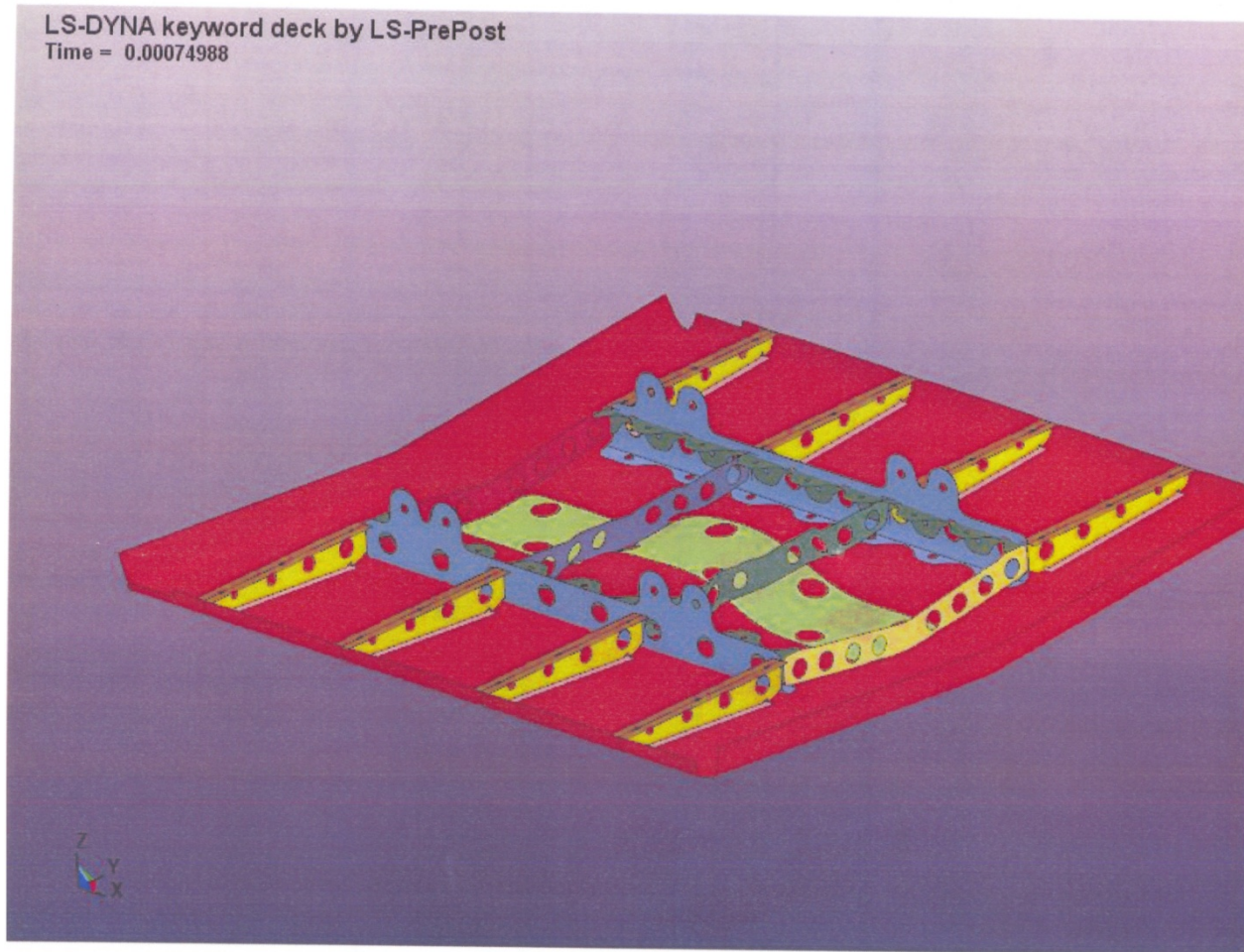




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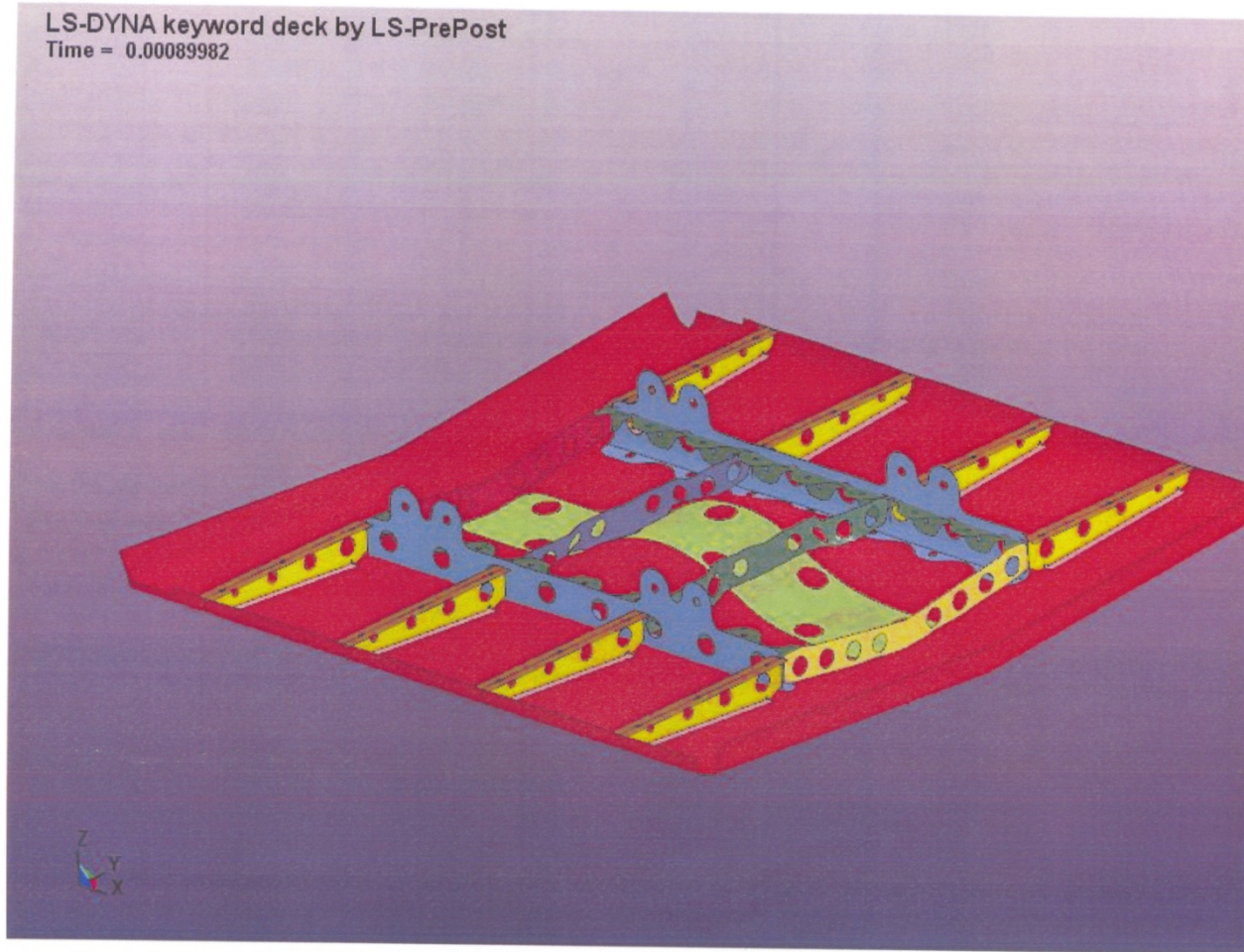


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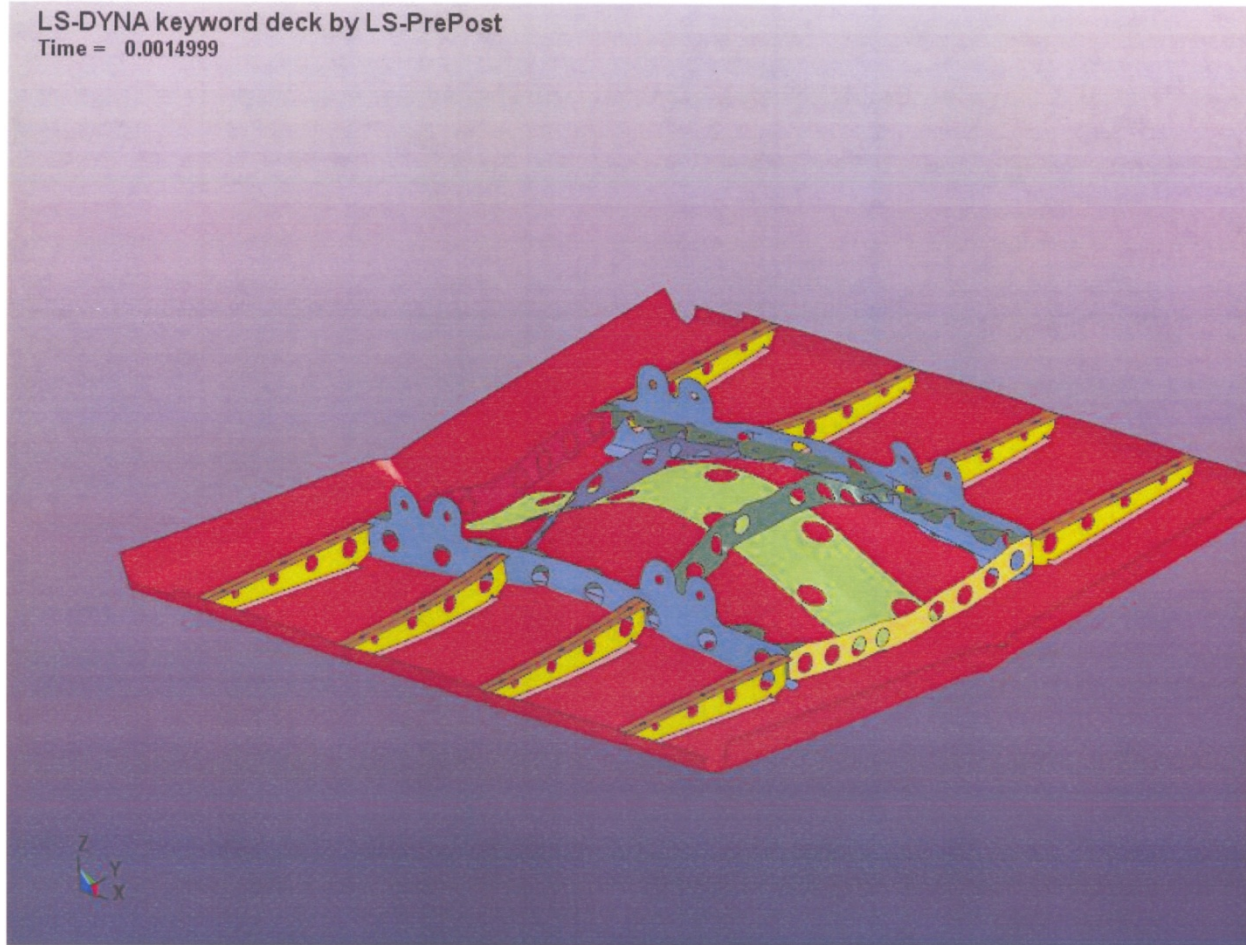




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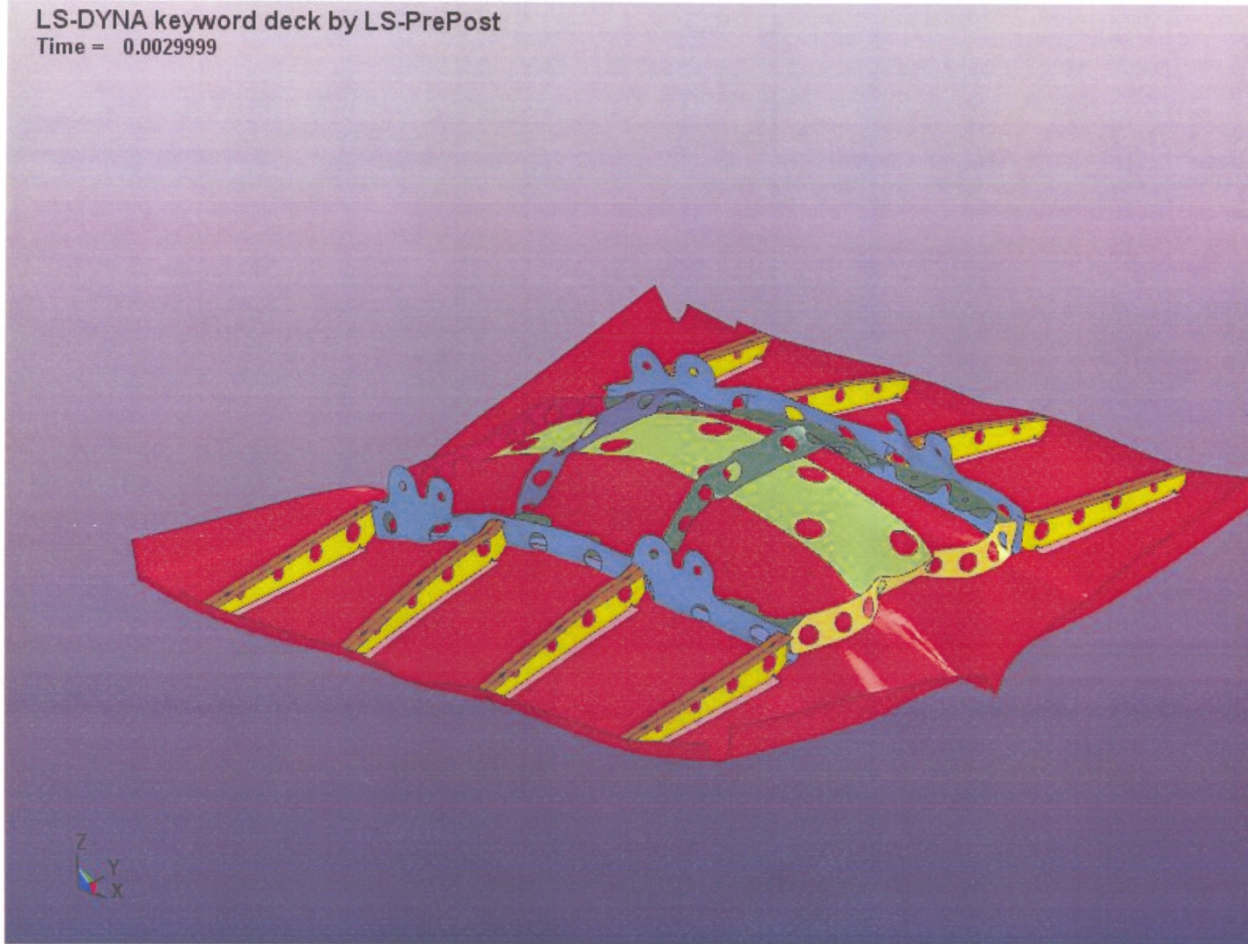


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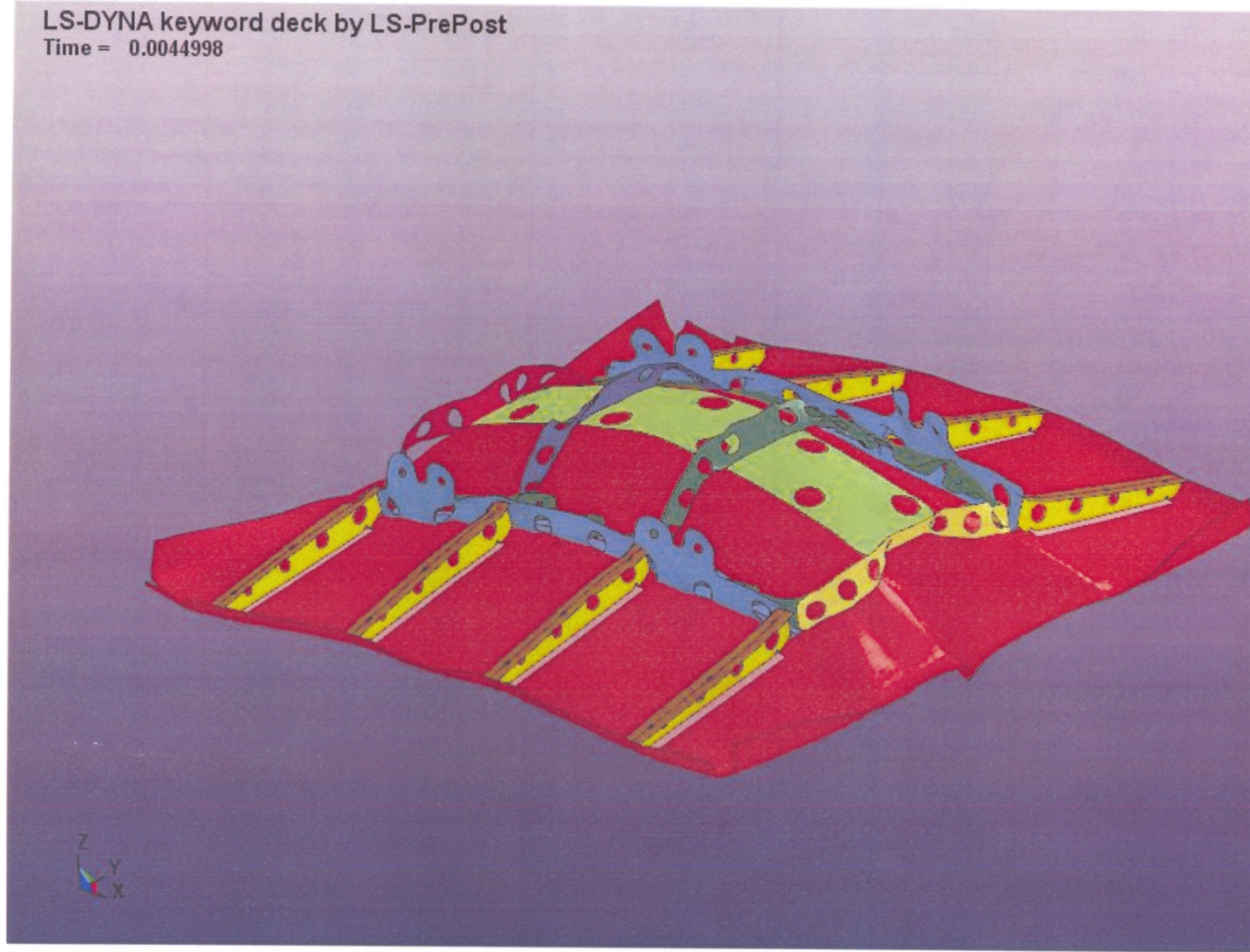




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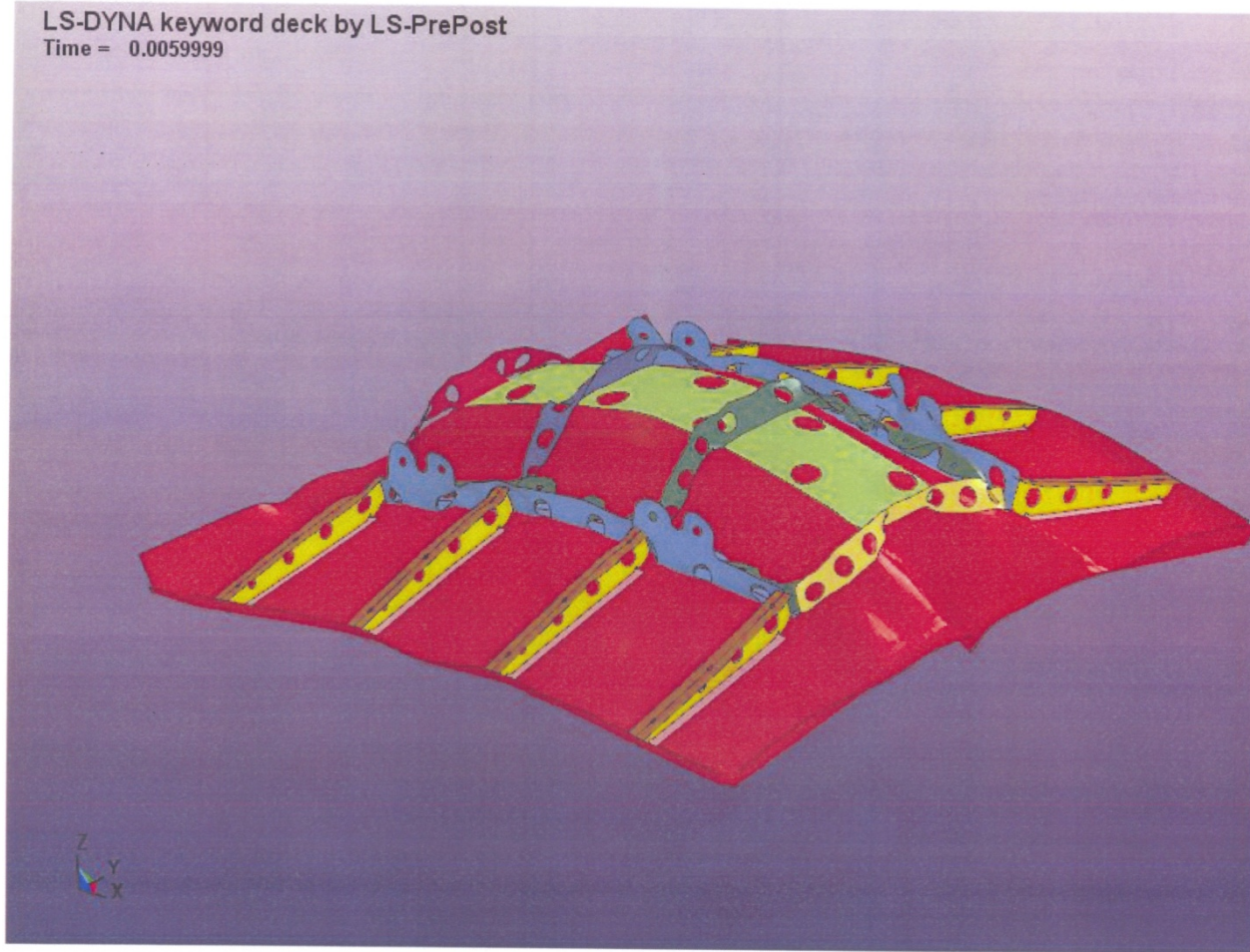


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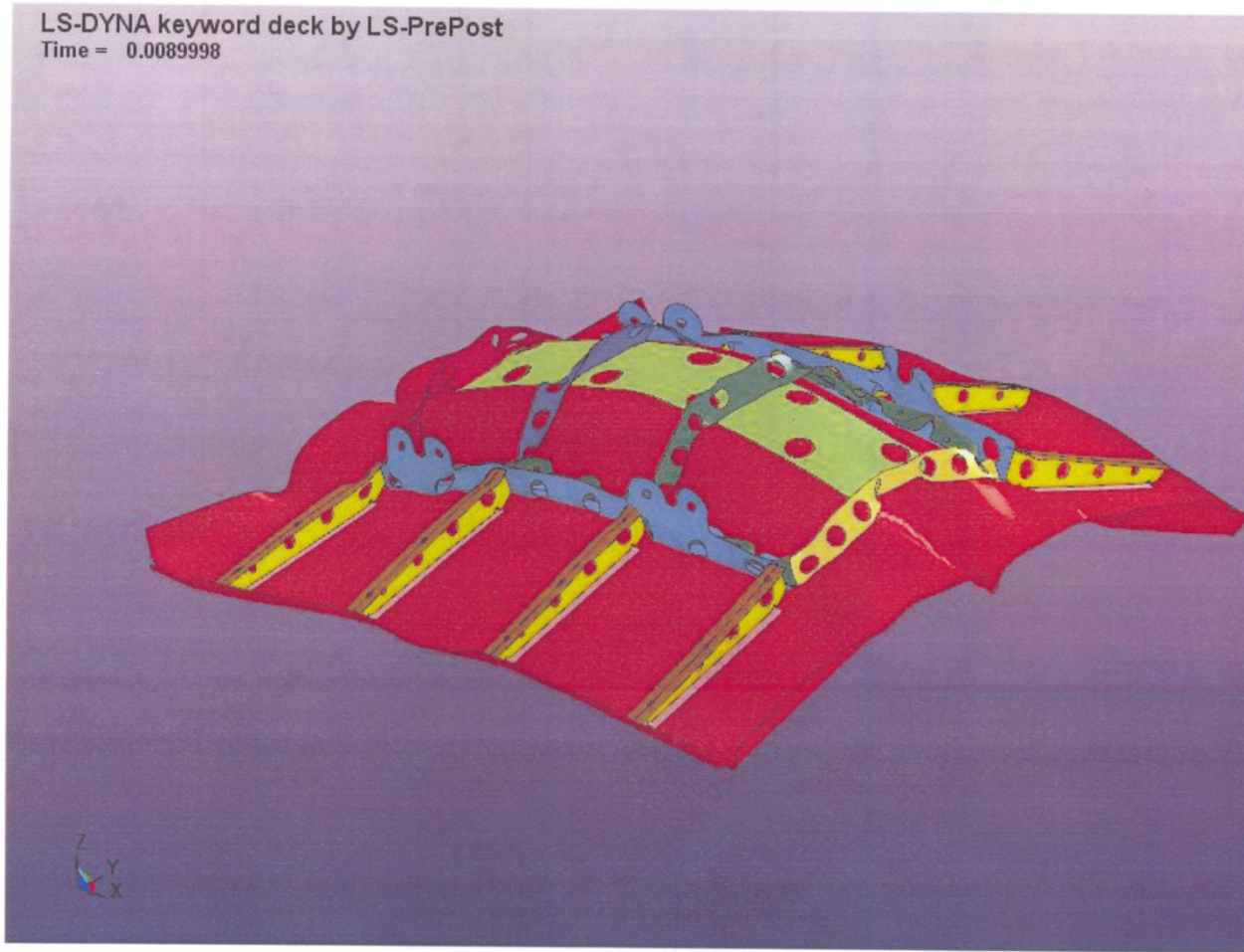




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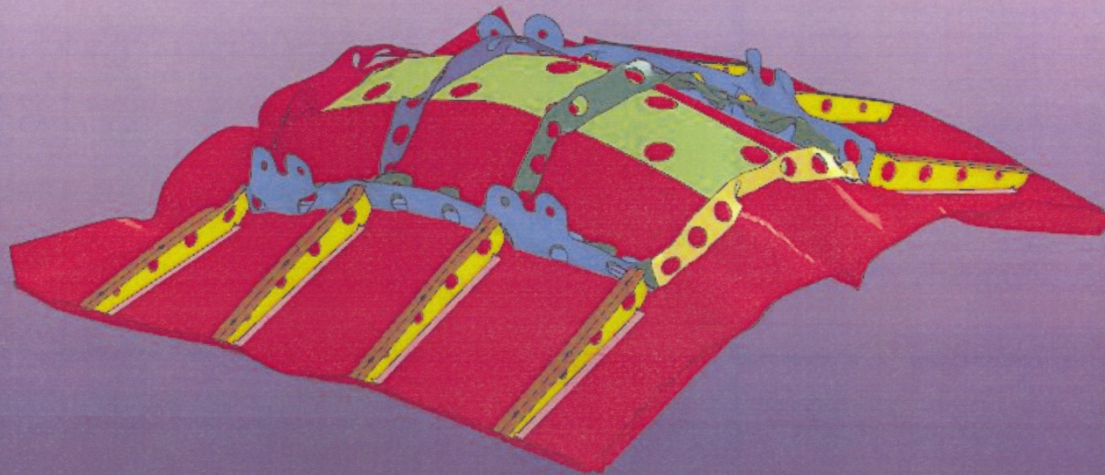


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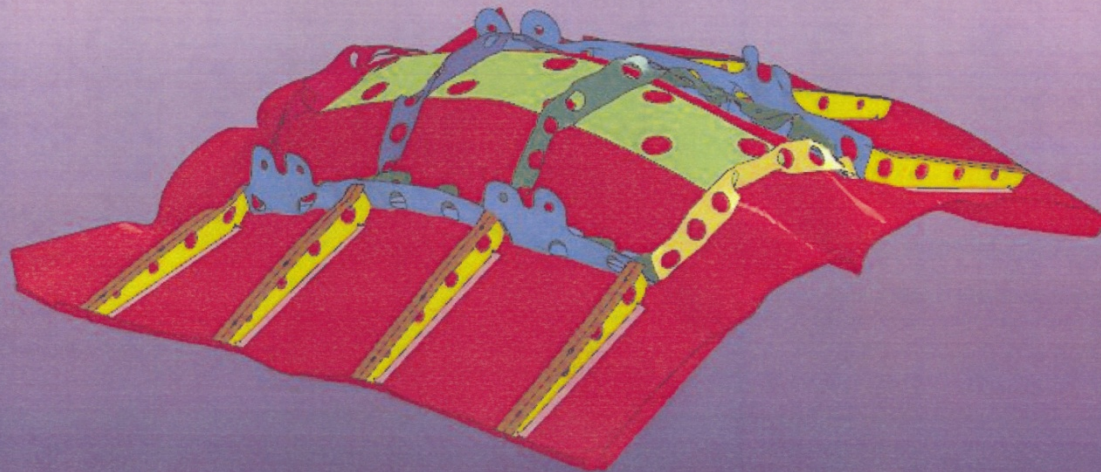




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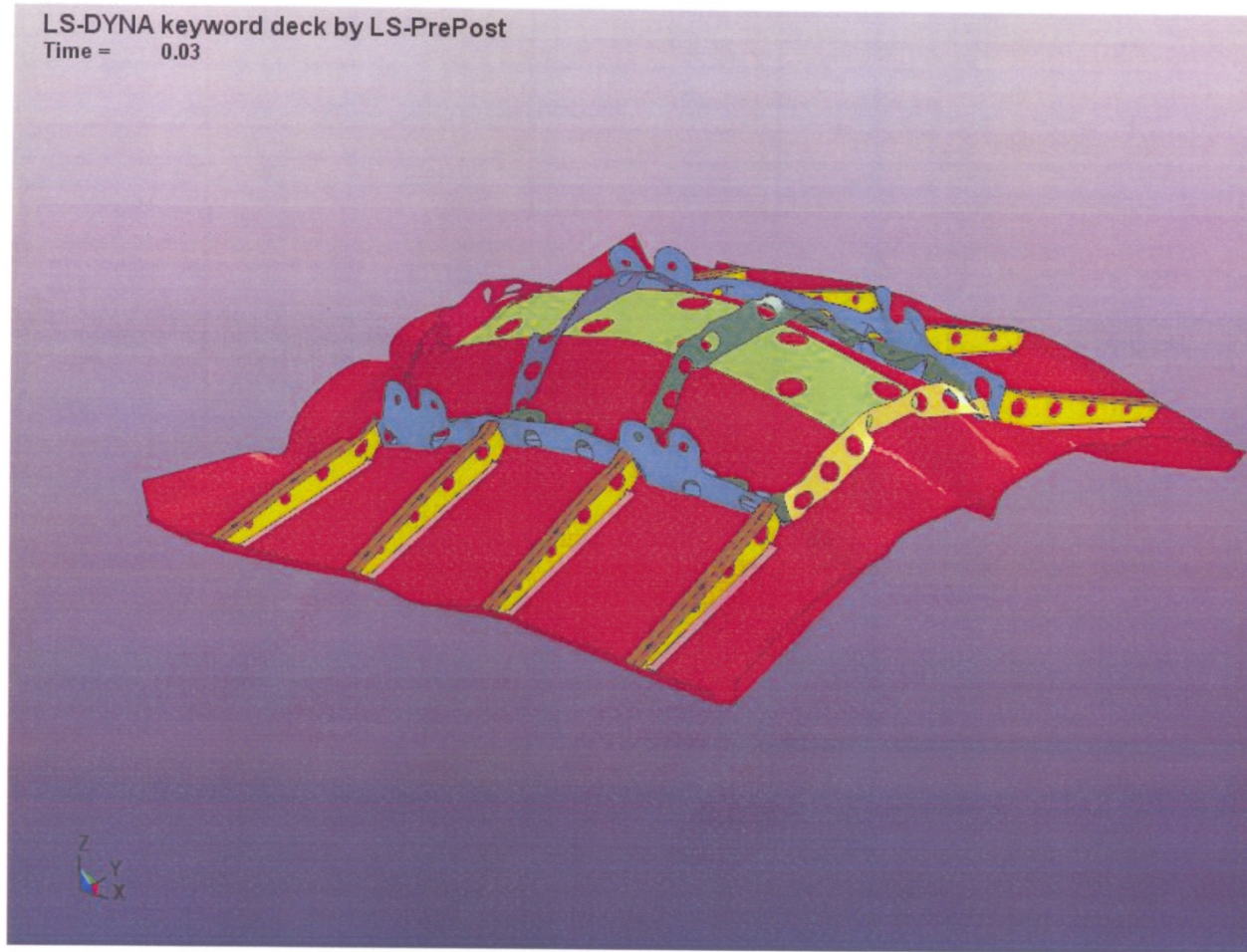


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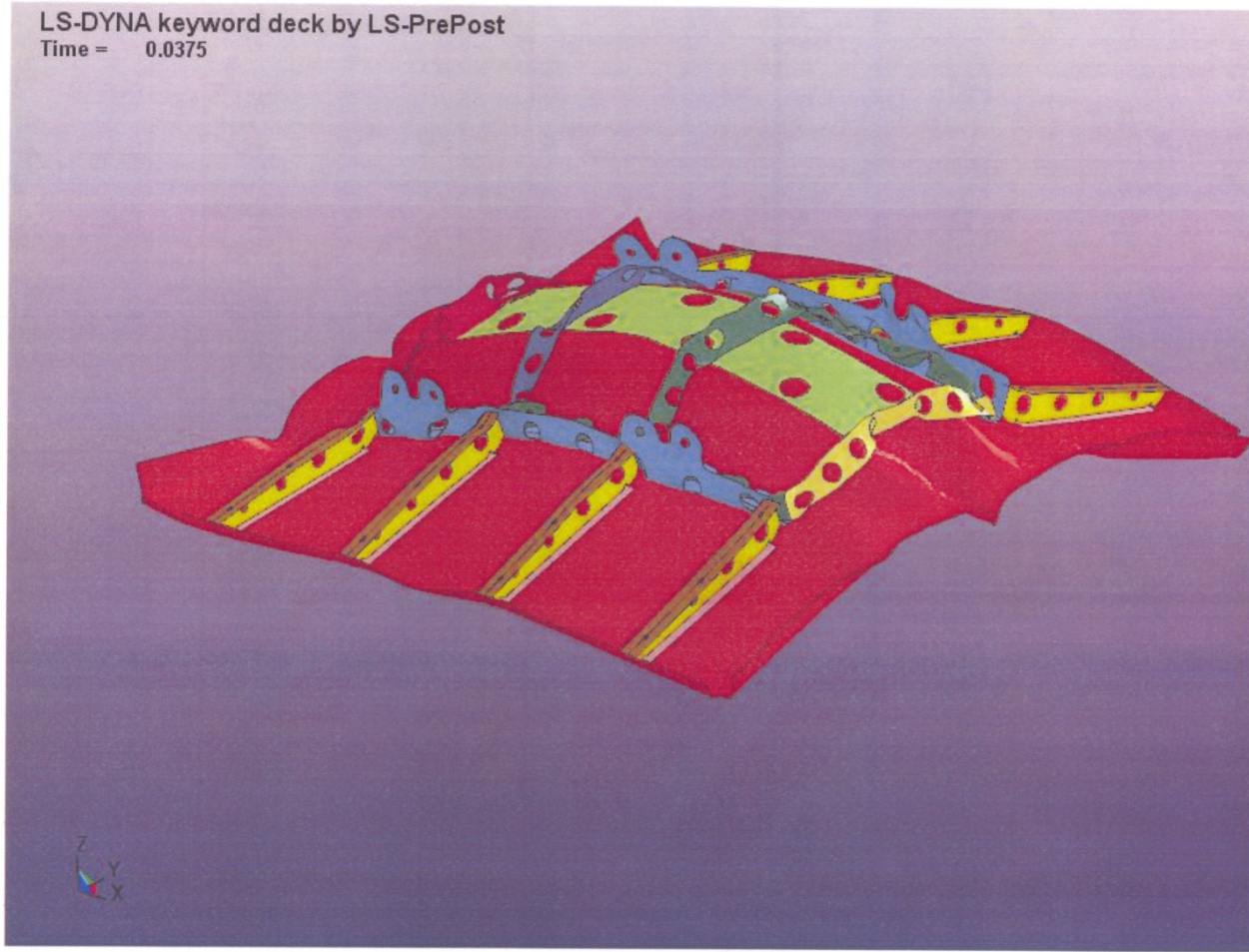




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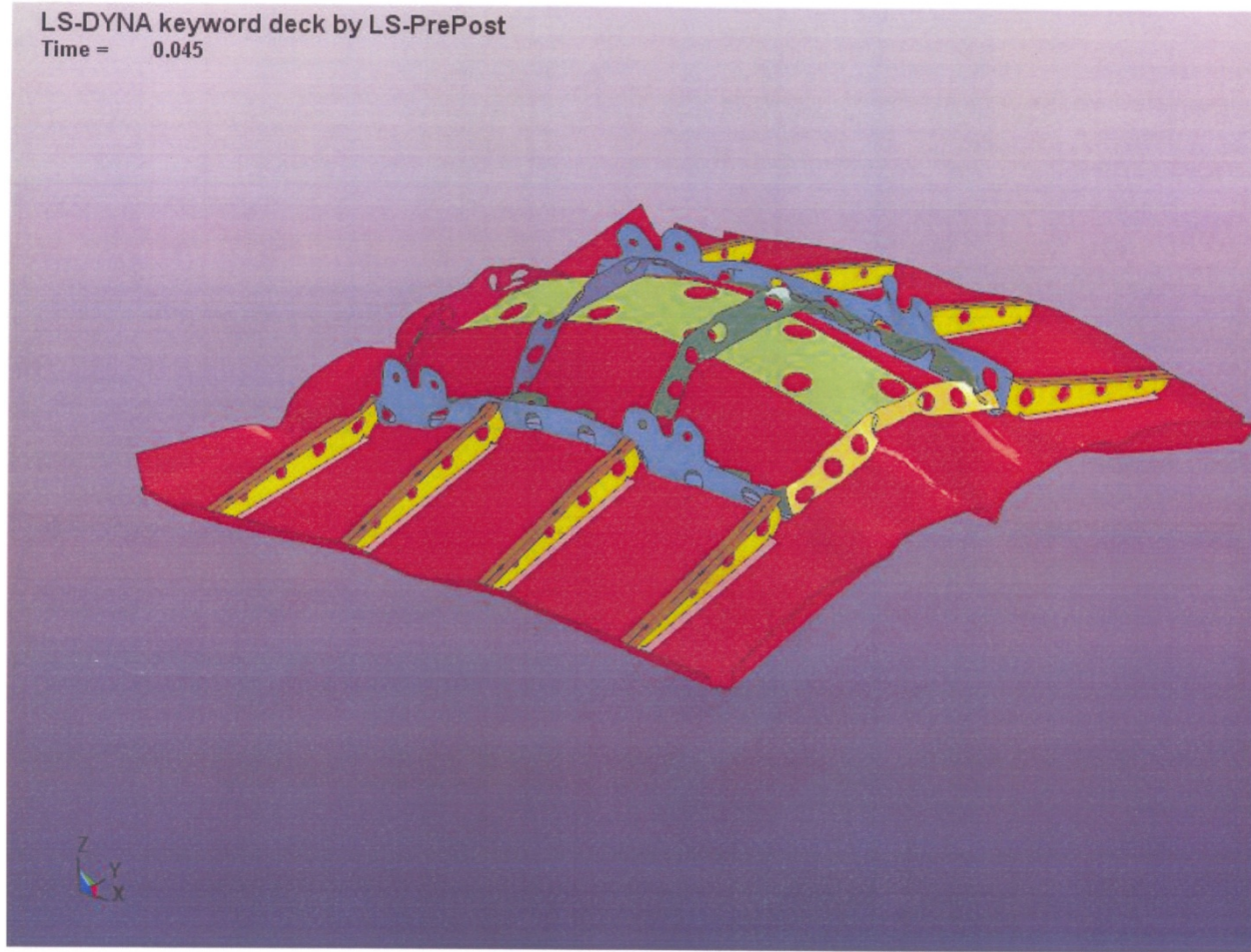


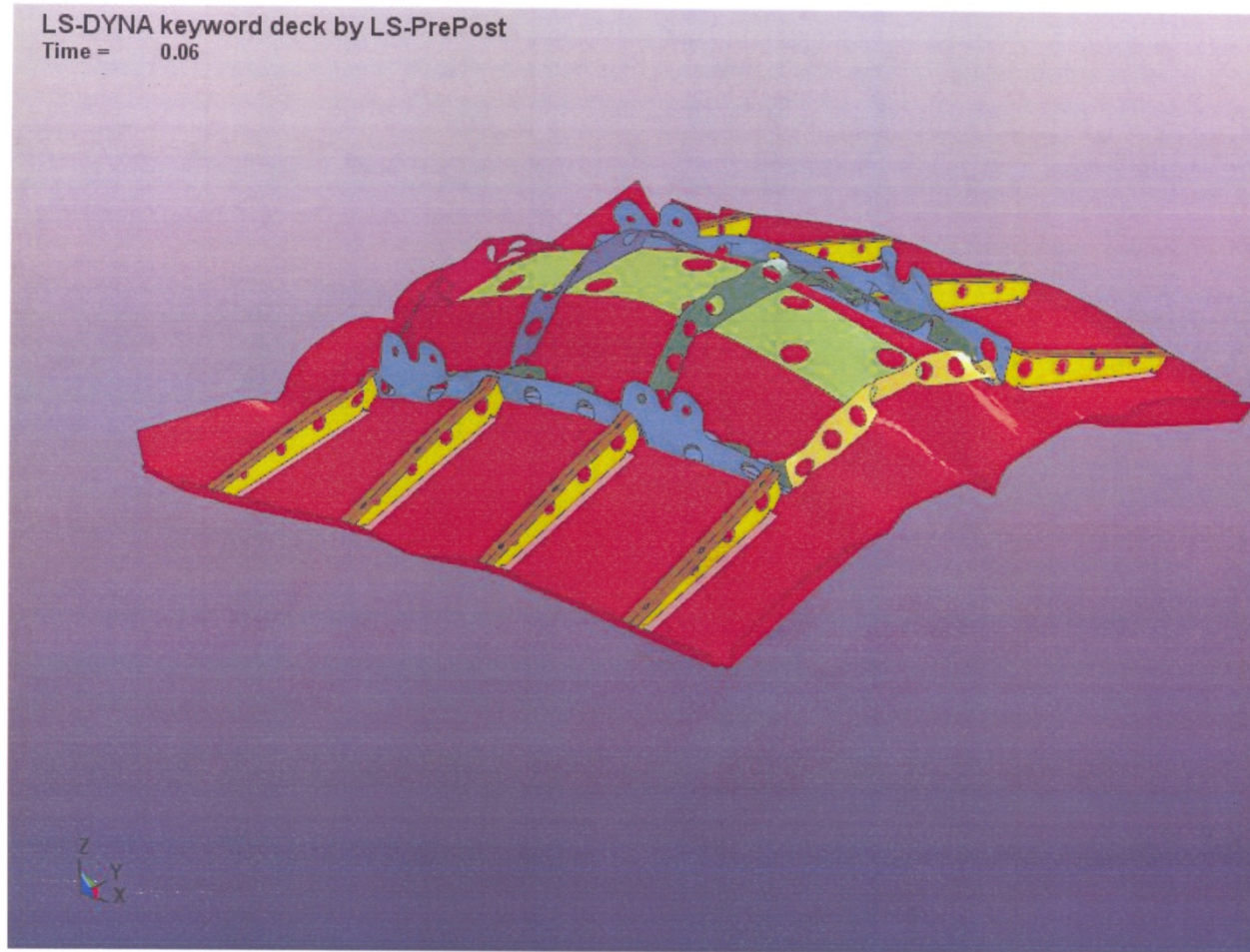
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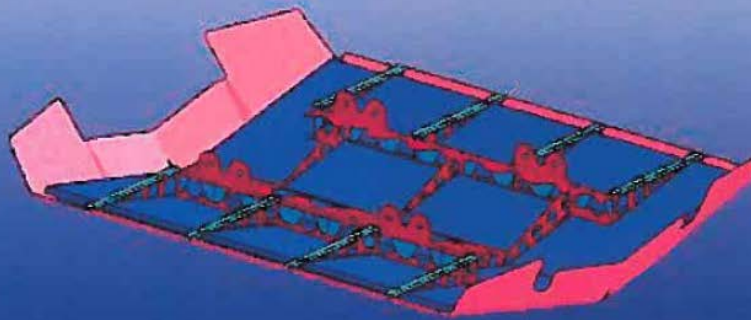
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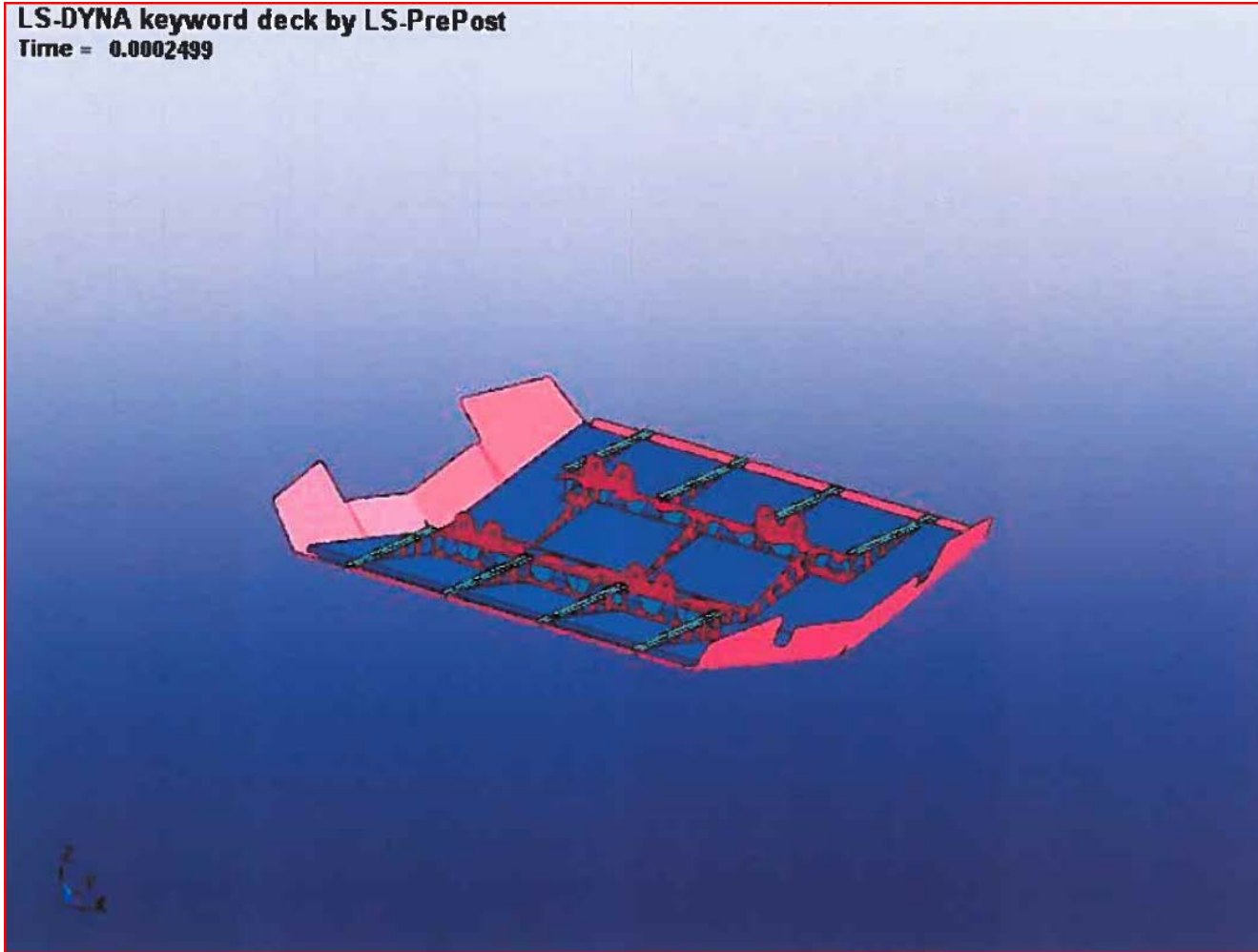
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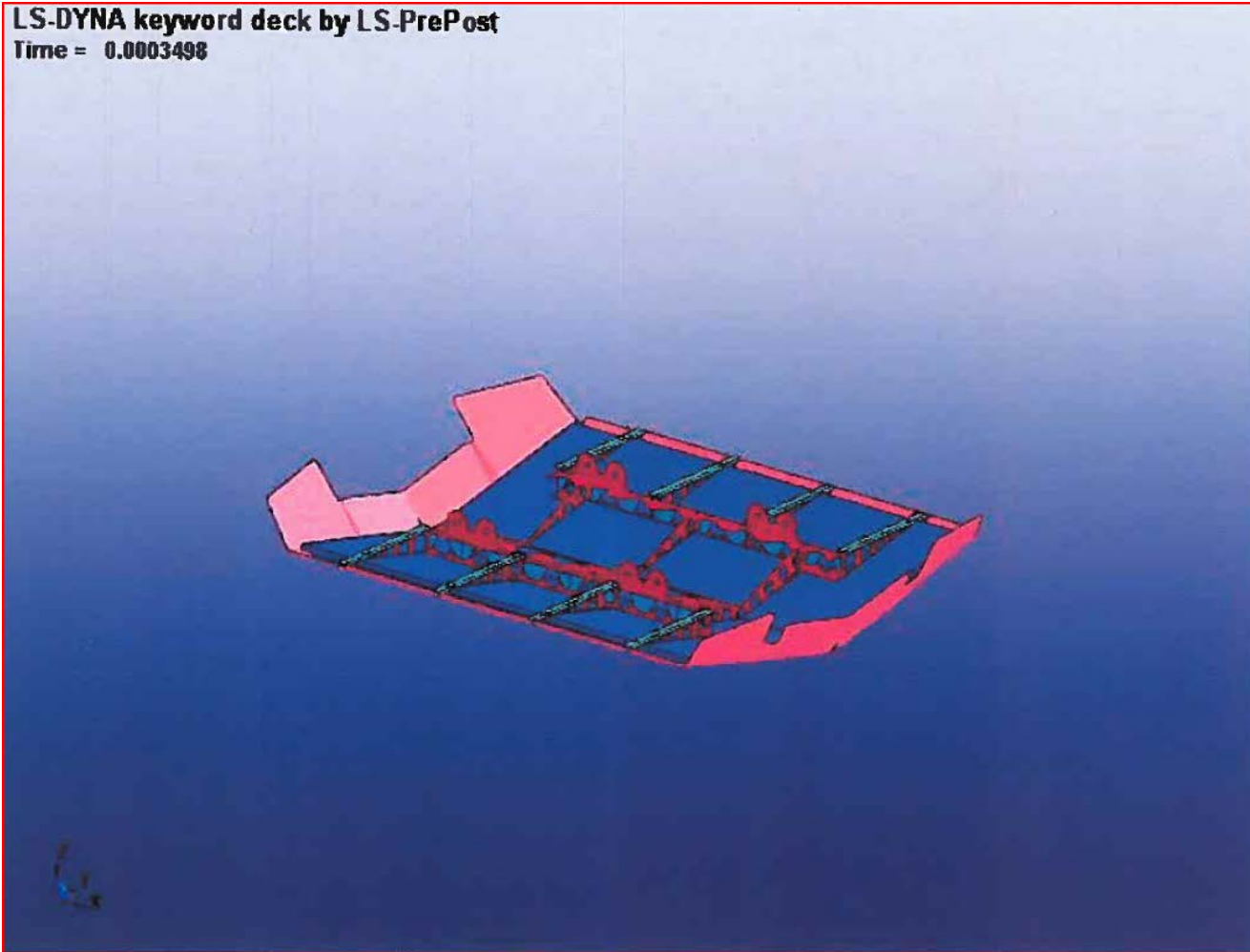
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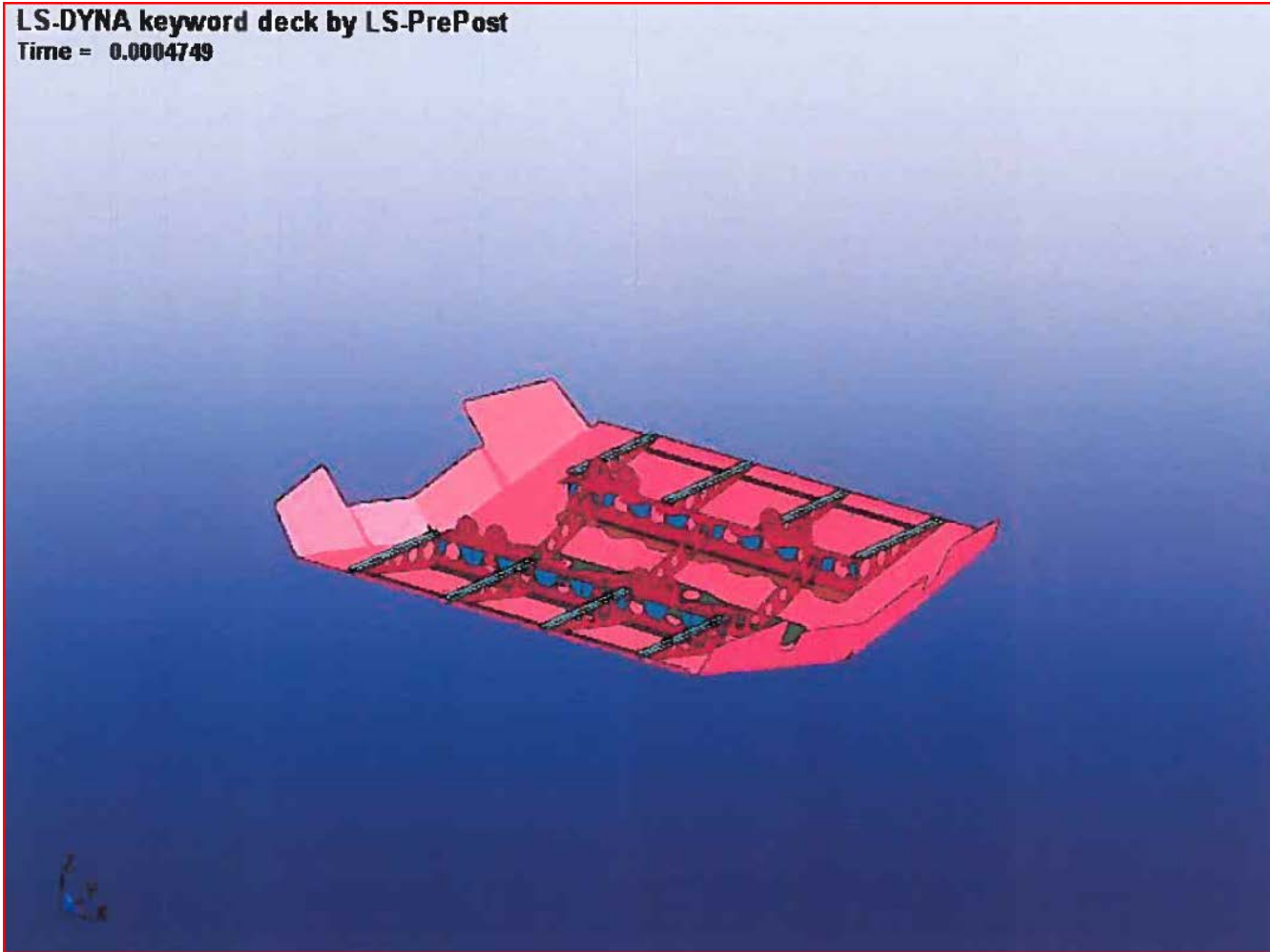




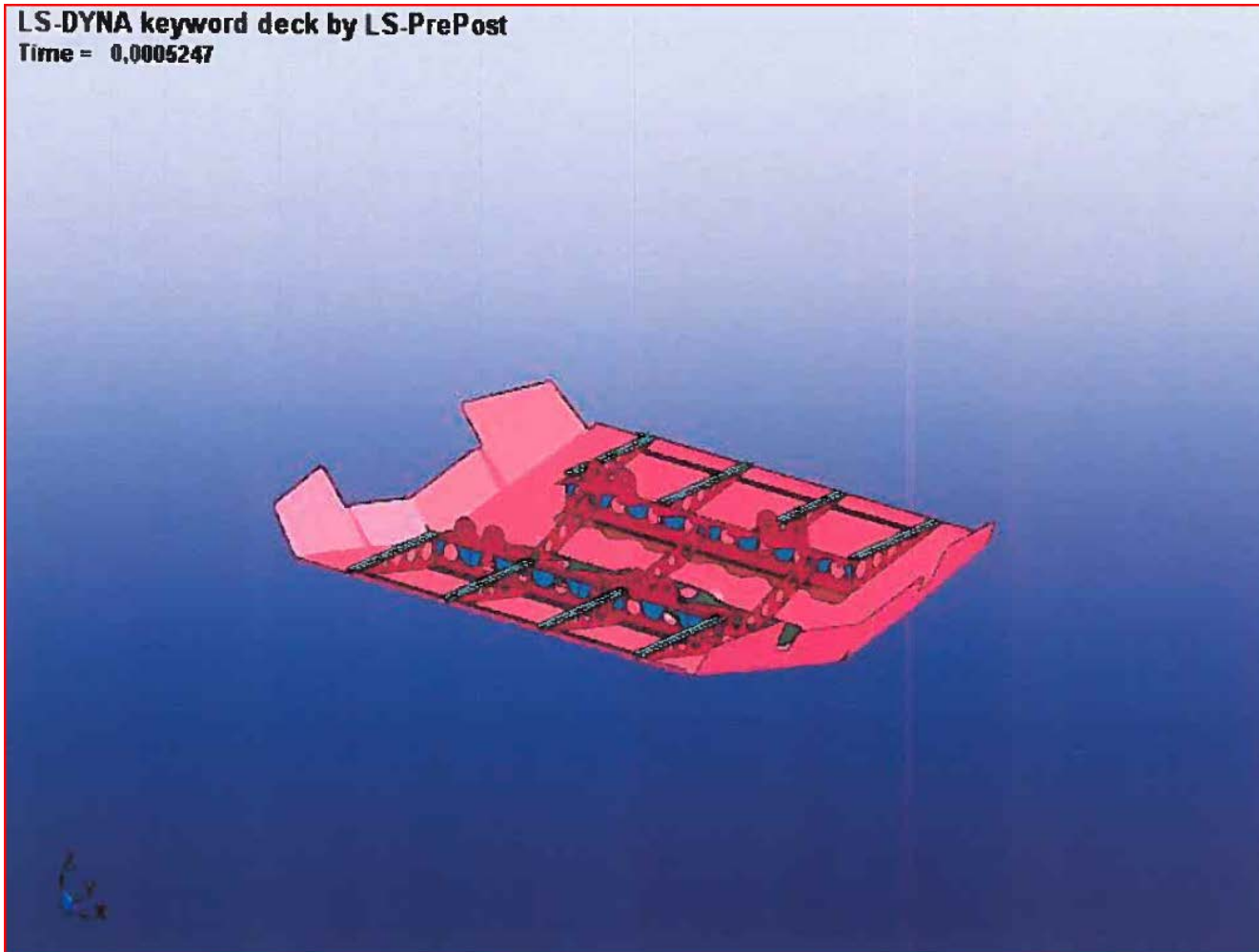
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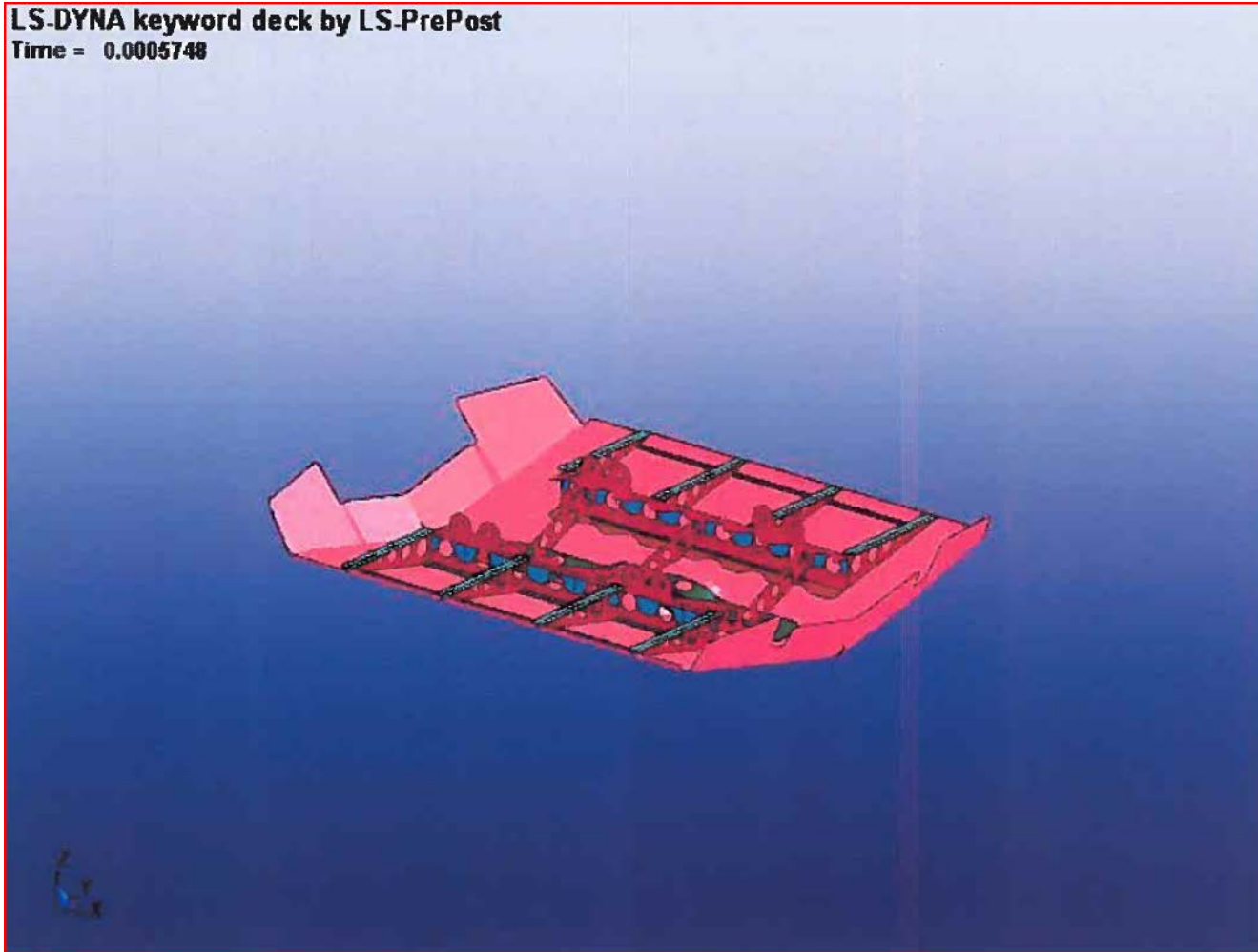


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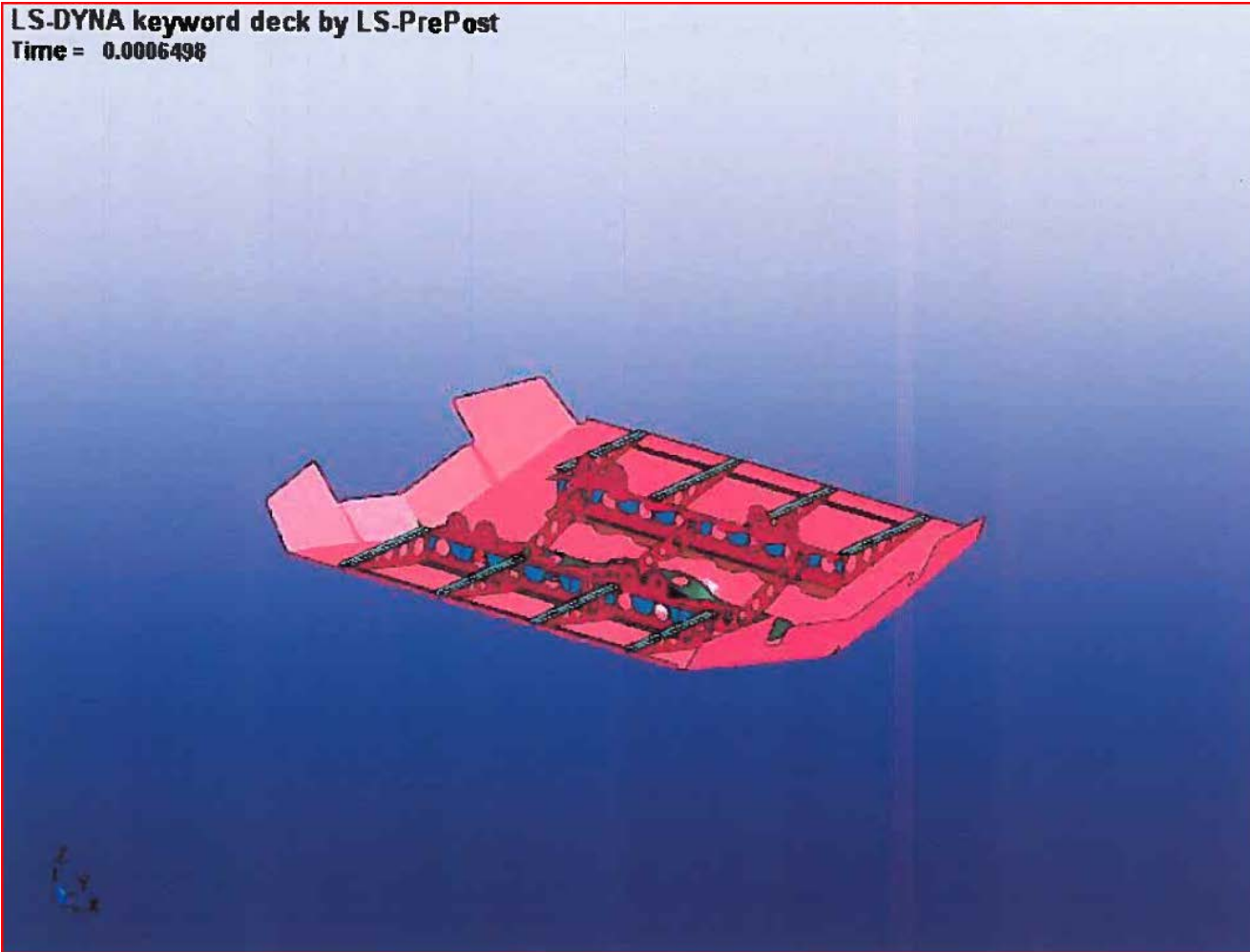




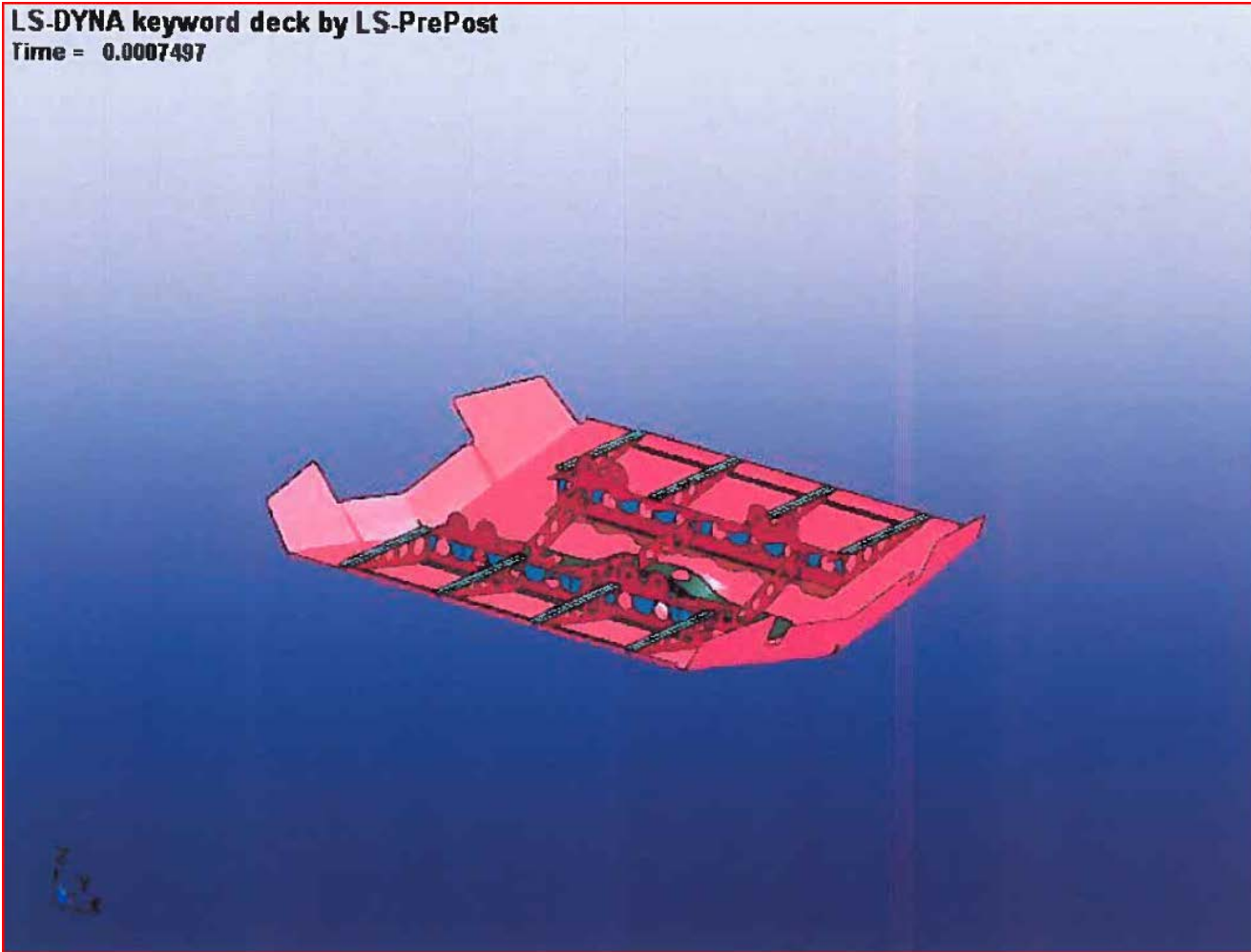
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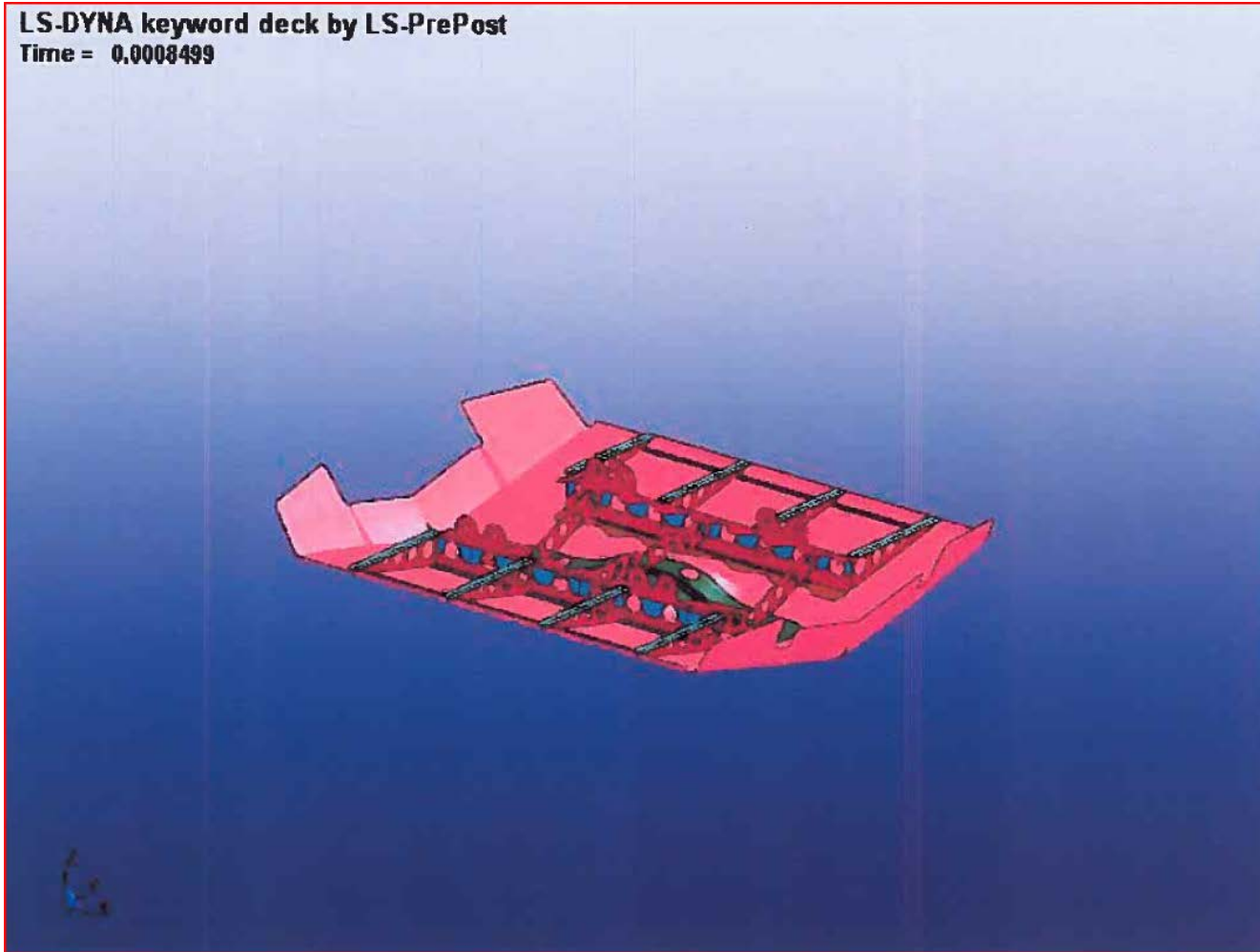


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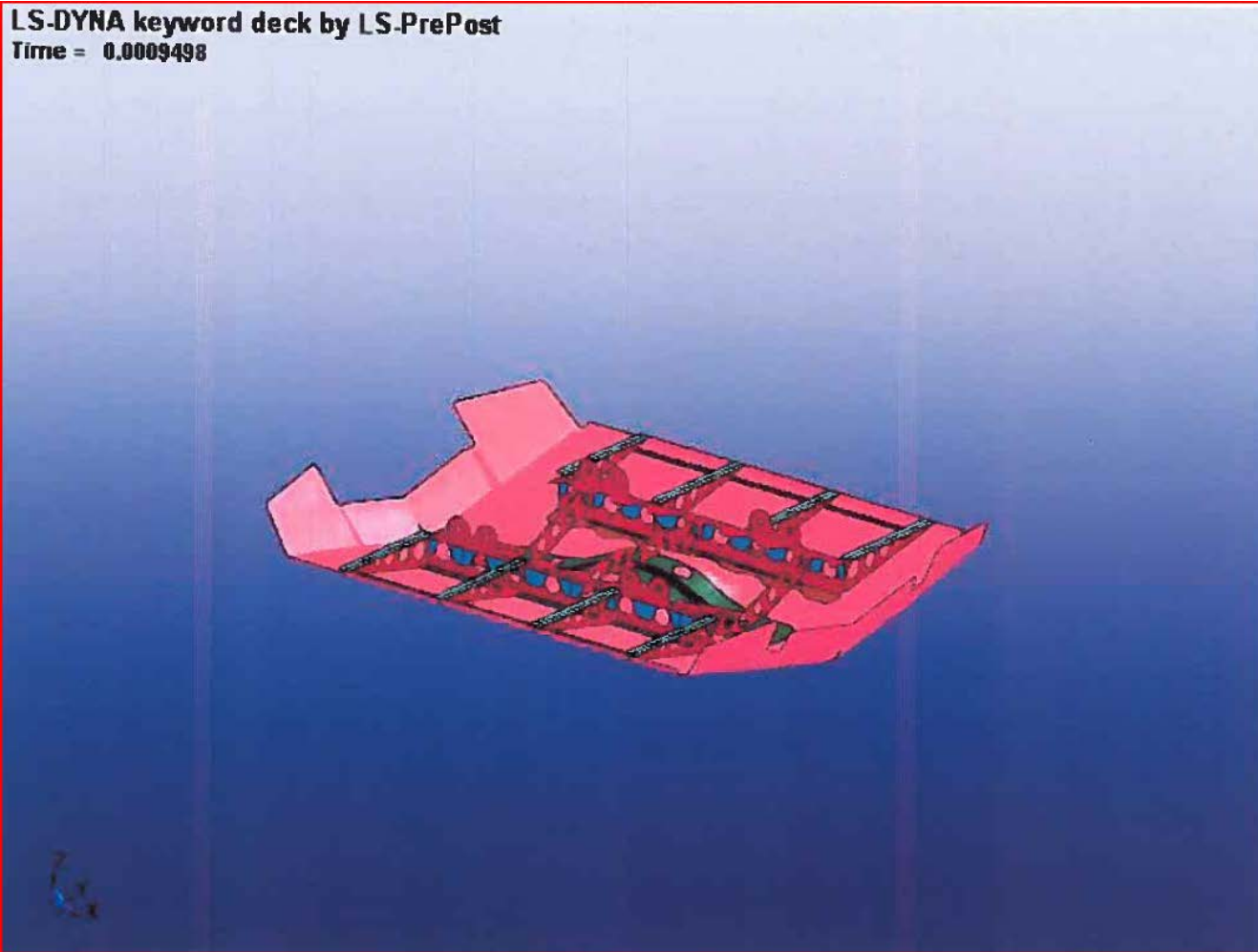




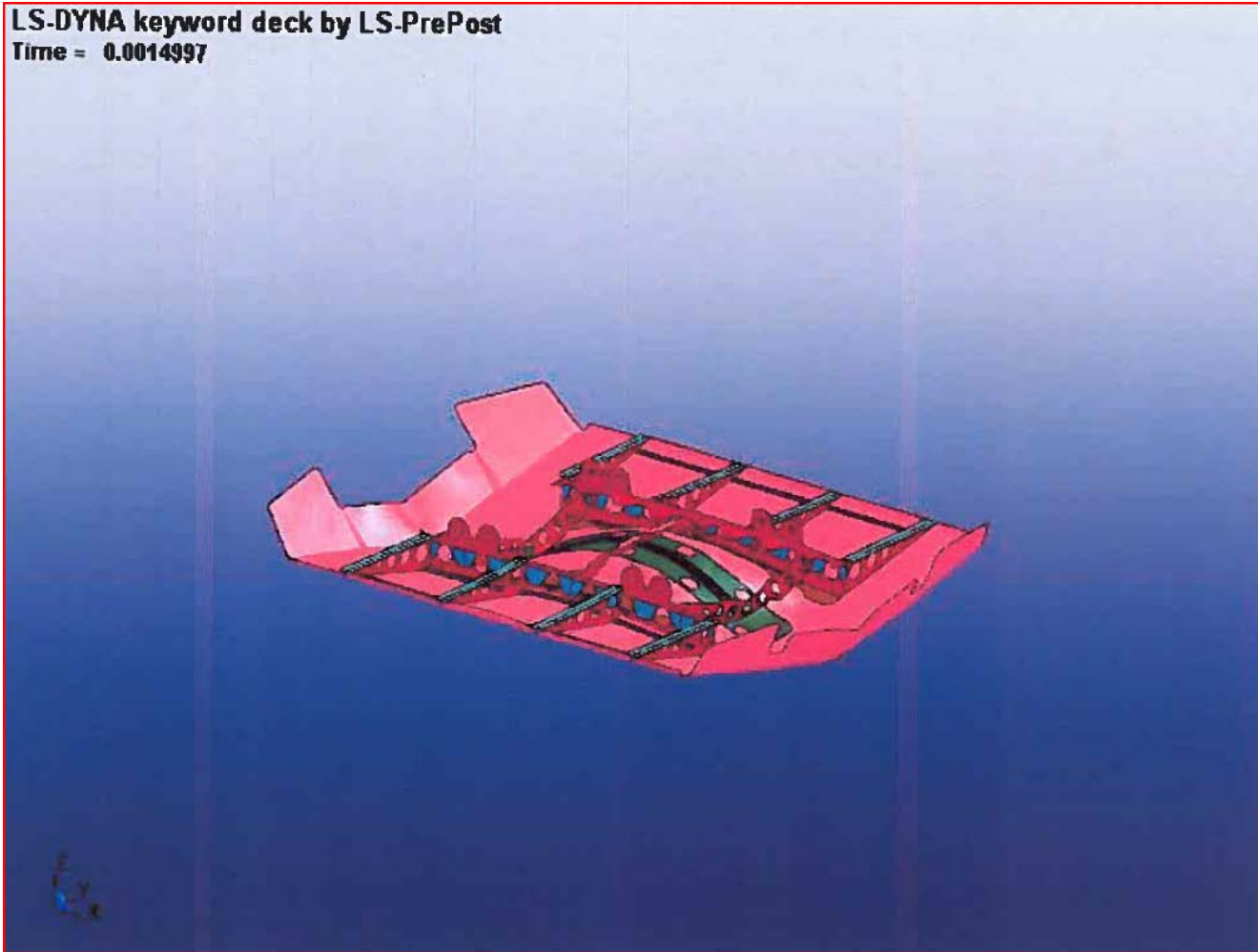
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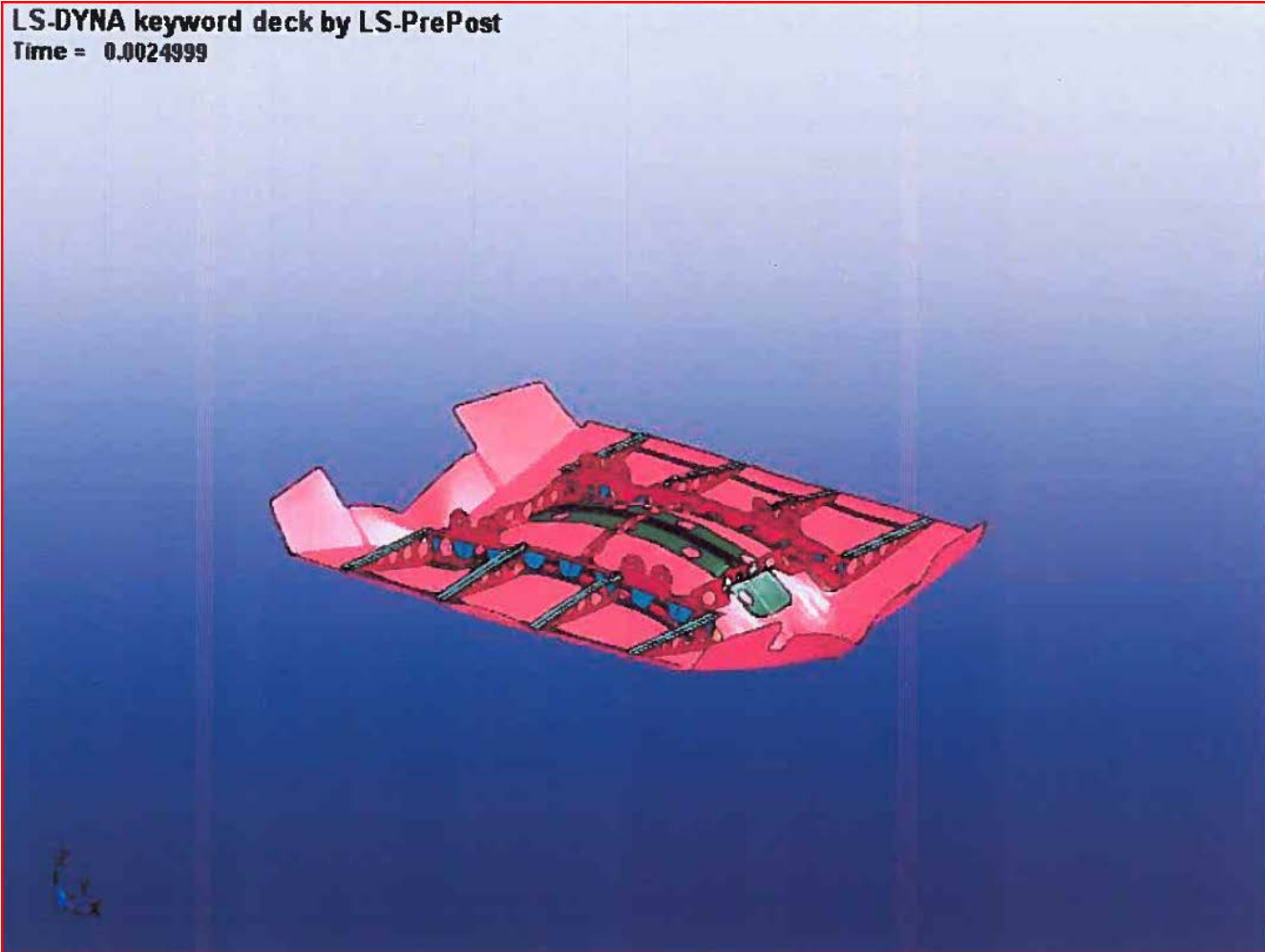


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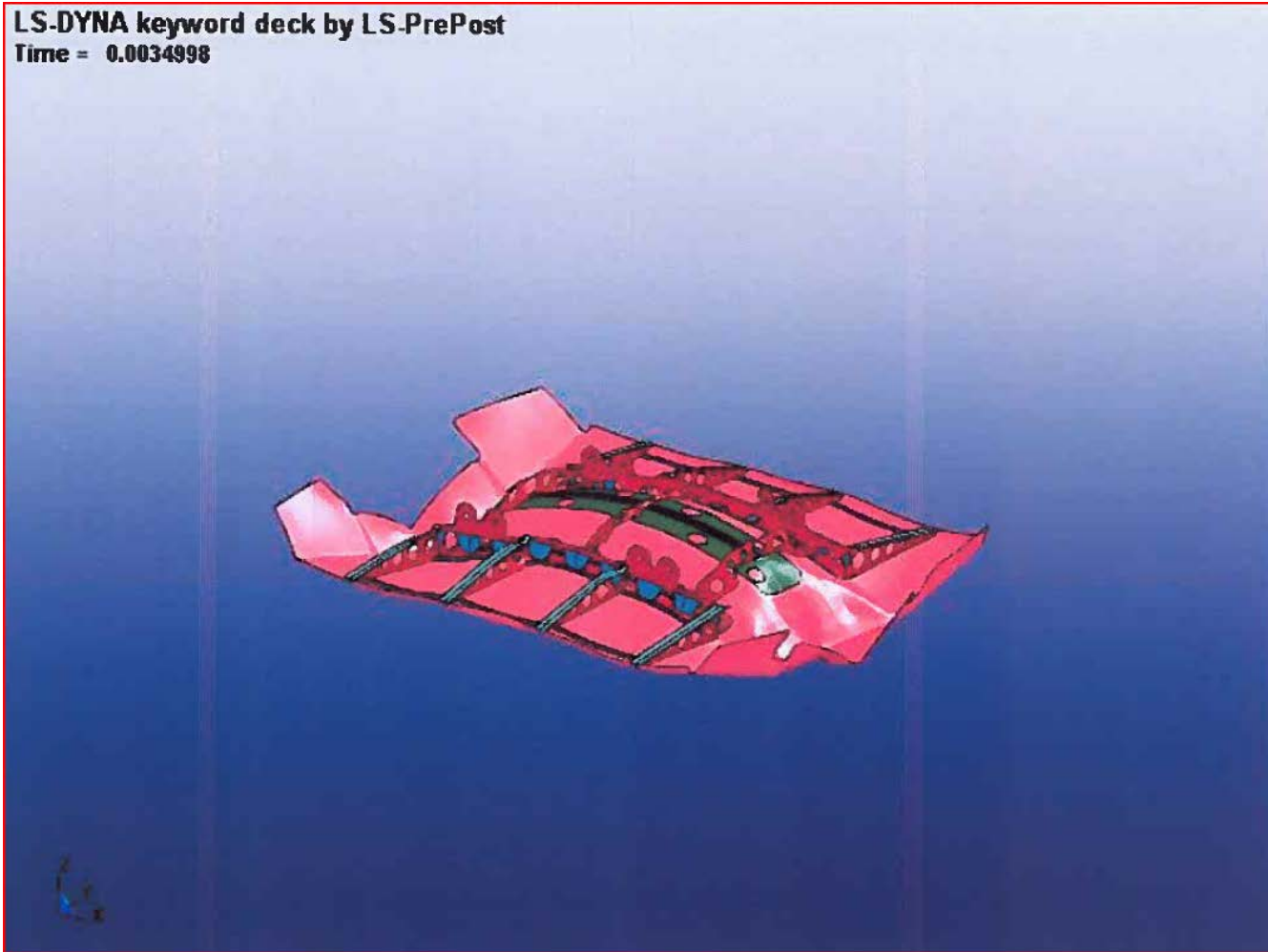




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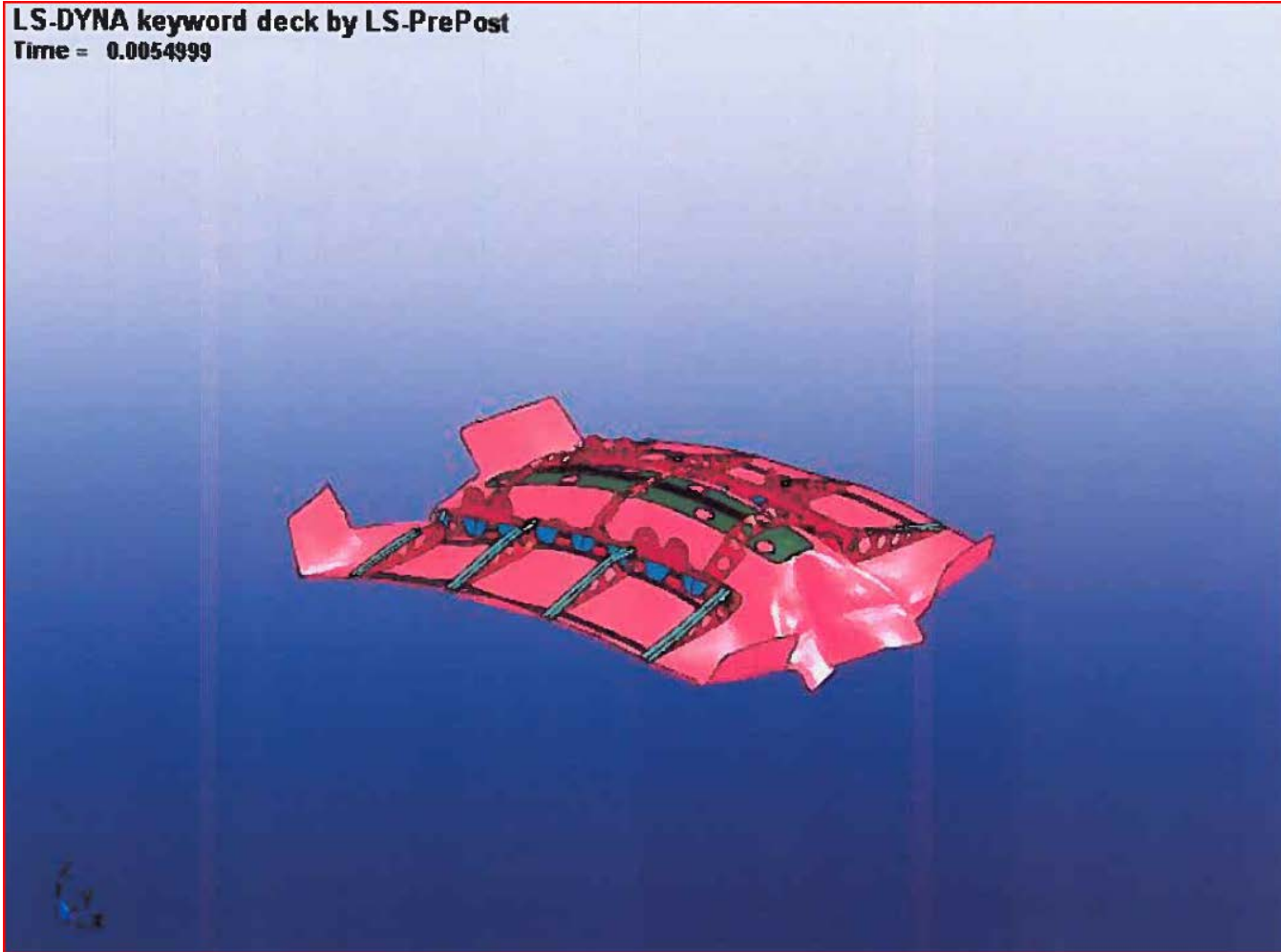


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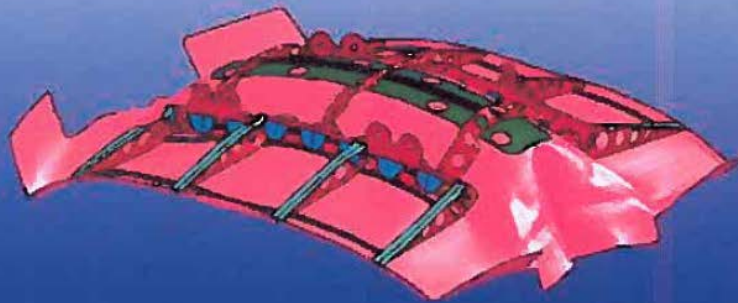




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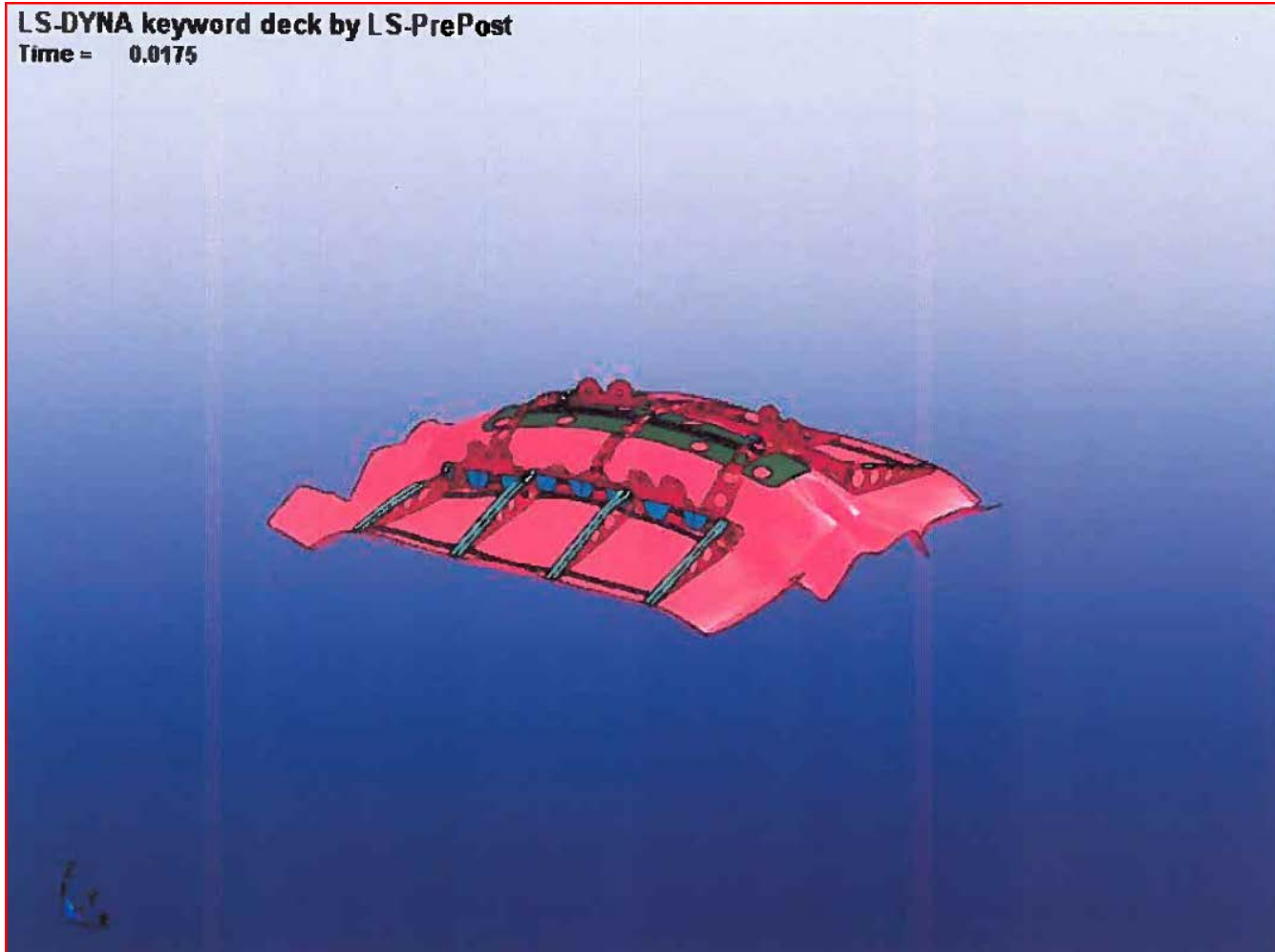




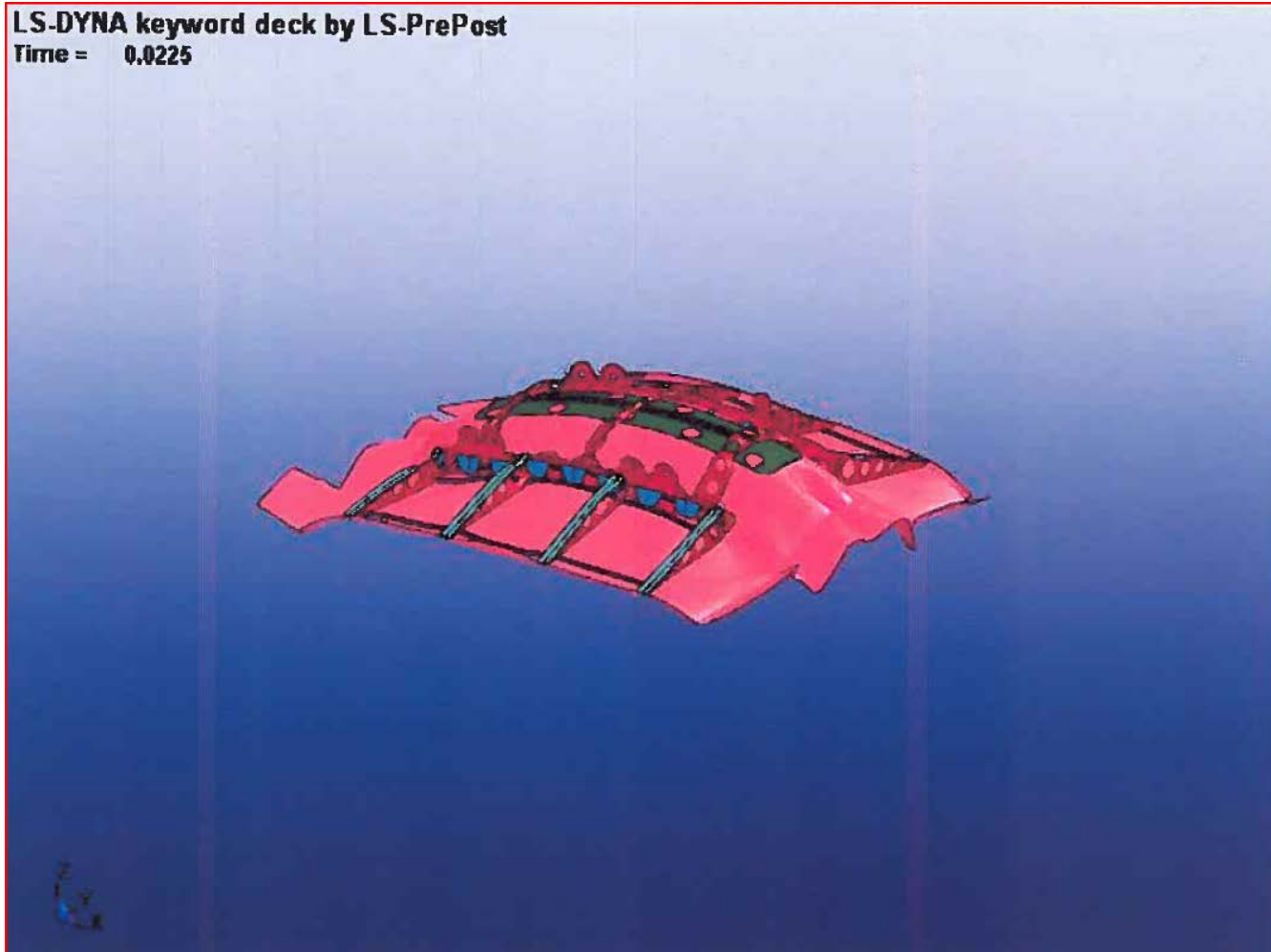
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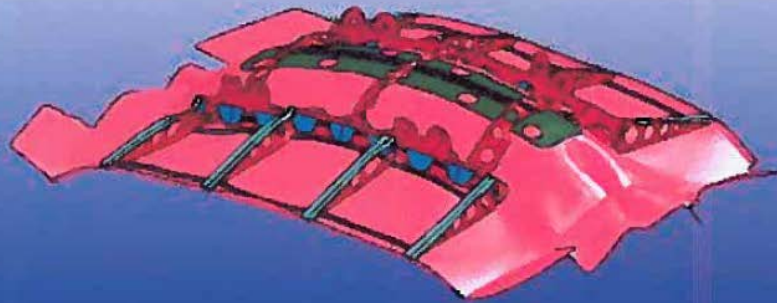




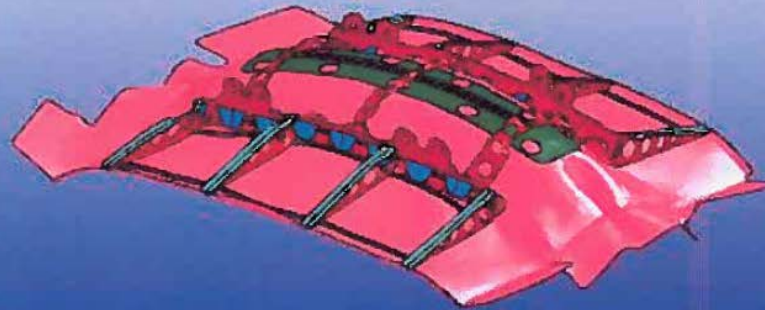
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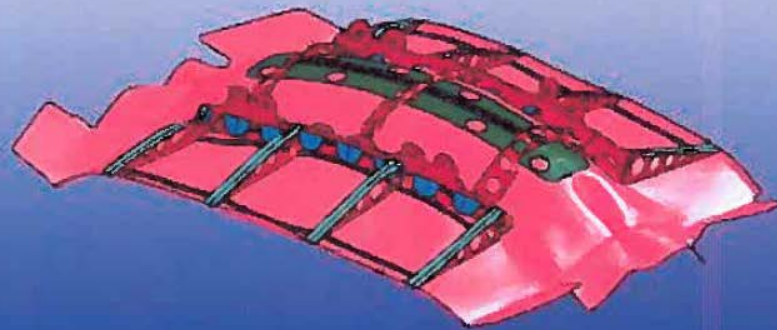


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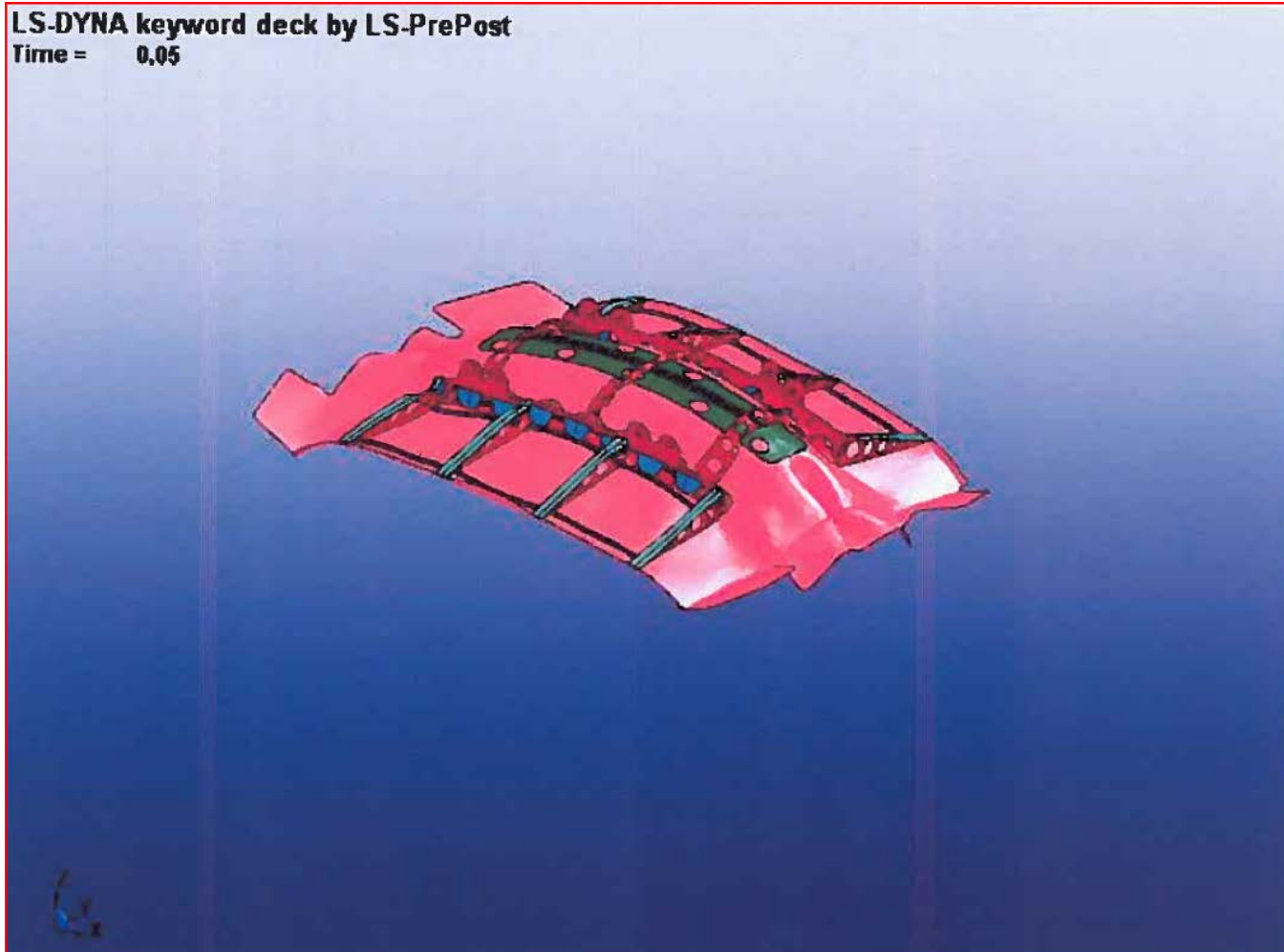




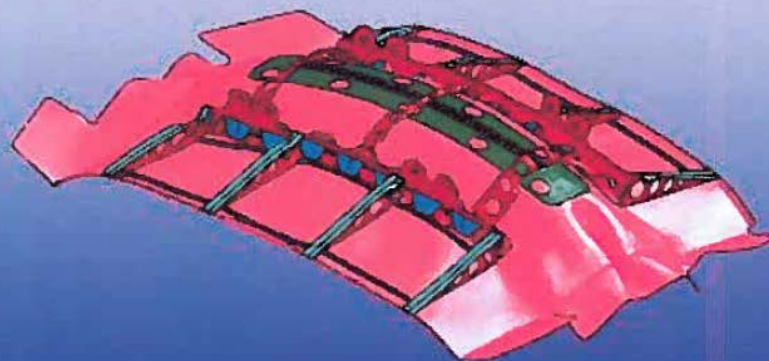
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- **Performance of the 9° V-Hull Produced:**
  - High accelerative loads
  - Unfavorable displacement
- **Performance of the 24° V-Hull Produced:**
  - Improved accelerative loads, however still above acceptable levels
  - Improved vehicle displacement, however still above acceptable levels



# Conclusion

- The system in its current configuration provides assembly issues due to the accessibility of the mounting holes
- Underbody produces an unfavorable drop in mobility